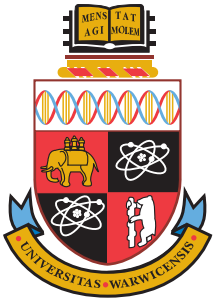


Essays on the Economic Origins of Party-System Structure and Political Participation

by

Konstantinos Matakos

Thesis

Submitted to the University of Warwick

for the degree of

Doctor of Philosophy

Advisors: Professors Bhaskar Dutta and Benjamin Lockwood

Department of Economics

March 2012

THE UNIVERSITY OF WARWICK

Abstract

Essays on the Economic Origins of Party-System Structure and Political Participation

Konstantinos Matakos

2013

This dissertation explores the economic origins of party-system structure and the role of economic institutions in determining political outcomes and electoral participation. Chapter 2 studies the impact of unemployment on electoral fragmentation. Employing a four-party model of redistributive politics with two dimensions of choice (economic policy and ideology), we uncover a non-monotonic relationship between unemployment and fragmentation. In equilibrium, big parties woo the unemployed voters who are relatively more willing to switch their votes in response to generous redistribution. When the tax-base is large enough, allowing for more redistribution, an initial rise in unemployment favors the big parties by increasing the amount of the target constituency that is up for grabs. We identify two necessary conditions for opportunistic parties to be able to capitalize on this relationship: (i) the existence of an effective public redistribution mechanism and (ii) the lack of institutional checks and balances. Using data from OECD economies, we confirm empirically the relationship between economic and political outcomes. We find that variation in unemployment alone can account for two-thirds of the variation in party-system fragmentation. Using data from Greek local elections, to exploit the information shock, we test the role of institutional constraints in limiting opportunistic redistribution and increasing fragmentation. Overall, Chapter 2 lays a theoretical and empirical framework that relates economic outcomes with party-system structure. It also provides a special interest politics justification for redistribution. Finally, it

highlights the importance of institutional constraints and economic institutions in guaranteeing political pluralism and power-sharing.

Chapter 3, using again data from Greek elections explores empirically the link between economic adversity, trust and voter turnout. It identifies two links: one normative, declining trust in the party-system, and one rationalistic, the weakening of party-group linkages. We find that the fiscal shock caused a collapse in voter turn-out. Moreover, the decline was larger in regions with relatively larger public sector. Using suitable instruments from the institutional set-up of Ottoman Greece, we document a negative relationship between economic adversity and voter turn-out operating through both links (trust and party-group linkages). We also show that the size of the public sector acts as a catalyst in exacerbating the effects of economic shocks on turn-out. The policy implications are clear: financial or institutional measures that reduce the size of public sector and aim at increasing transparency, trust and voter participation might have a second-order negative effect on turnout by reducing party-voter linkages. For Greece, the latter effect dominates, raising questions for the future of political participation.

Contents

Acknowledgements **vii**

I Part A: The Economic Origins of Party-Systems **1**

1 Introduction **2**

1.1 Unemployment and Redistribution 5

1.1.1 Literature Review 12

2 Unemployment, Redistributive Politics and Electoral Fragmentation **16**

2.1 Theoretical Model 17

2.1.1 Political Parties 18

2.1.2 The Voters 20

2.1.3 The Voting Game 22

2.1.4 Results 24

2.1.5 Main Comparative Statics Results 29

2.1.6 Some Remarks 32

2.2 Empirical Analysis 33

2.2.1 Data Description 35

2.2.2 The OLS Model 36

2.2.3 OLS Results . . . 38
2.2.4 Accounting for Endogeneity and OVB: Introducing Oil Price Shocks . . . 40
2.2.5 Addressing Concerns of Weak Instruments: The Just-identified Model . . . 47
2.3 The Role of Institutional Constraints: The "Greek Case" . . . 52
2.3.1 A Shock on Information . . . 53
2.3.2 Data and Identification Strategy . . . 54
2.3.3 Estimation Results: NUTS-3 Level . . . 57
2.3.4 Discussion of the Results . . . 58
2.4 Concluding remarks . . . 60

3 Economic Adversity, Trust and Turnout: A Natural Experiment 62

3.0.1 Literature Review . . . 64
3.1 Evidence on Turnout from Greek Elections . . . 68
3.1.1 Working Hypotheses . . . 70
3.2 Data and Identification . . . 72
3.2.1 Data Description . . . 73
3.2.2 Identification Strategy . . . 74
3.2.3 Estimation Results: NUTS-2 Level . . . 76
3.3 Identification revisited: Going NUTS-3 . . . 77
3.3.1 Identifying High Public Sector Regions with an Instrumental Variable . . . 78
3.3.2 Econometric Specification . . . 81
3.3.3 Estimation Results: NUTS-3 Level . . . 84
3.3.4 Discussion of the Results . . . 88

3.4 Conclusions 89

II Appendix **92**

A The Greek Case-study **93**

A.1 The Information Shock and the Timing of Events 93

A.2 The Greek Party-System: History and Structure 97

A.2.1 Greek Local Government: Structure and Operation[1] 98

A.2.2 The Finances of Greek Local Government[2] 99

A.2.3 Relationship between Local and Central Government 103

A.2.4 The Relationship between National and Local Politics 104

A.3 Constructing our IV 105

A.3.1 From Ottoman Reforms to the Modern Greek State 108

A.4 Figures 111

A.5 Tables 112

B Supplementary Material for Chapter 2 **115**

B.1 An Implicit Test on our Redistributive Mechanism 115

B.2 The Economics Behind our Instrument: Oil Prices and Unemployment 117

B.3 The Just-Indentified Model with the Quadratic Term 122

B.4 Characterization Result for Mixed-strategy Equilibria 124

B.5 Correlated Dimensions of Electoral Competition: The Non-Symmetric Case 127

[1] This section is mainly adapted from the Council of Europe report (1994) titled "Structure and Operation of Local and Regional Democracy - Greece" and updated where necessary.

[2] This section is mainly adapted from the Council of Europe report (1994) titled "Structure and Operation of Local and Regional Democracy - Greece" and updated where necessary. Some data and tables in this section have been retrieved from Denny and Smith (1993) "Local Taxation - Report to the Commission DG XXI," prepared by the Institute for Fiscal Studies in London.

B.6 Robustness of Institutional Set-Up: Electoral Rules and Coalitions . . 128
B.6.1 Other Proofs 133
B.7 Graphs and Figures 146
B.8 Tables of Results 160

C Supplementary Material for Chapter 3 **172**
C.1 Graphs 173
C.2 Tables 179

Bibliography **189**

Preface

I attest that this Ph.D. Thesis is a product of my own work and it has not appeared for publication neither as a whole nor any parts of it. This Thesis is submitted in partial fulfillment of the requirements for the degree of Doctor in Philosophy at the University of Warwick.

Acknowledgements

I am extremely grateful to my supervisors, Professor Bhaskar Dutta and Professor Ben Lockwood for their invaluable supervision, support and constant encouragement. I have benefited enormously by working with both of them. I am also grateful to Prof. Herakles Polemarchakis with whom I worked during my MPhil. I would like to thank Sharun Mukand, Francesco Squintani, Vera E. Troeger, Fabian Waldinger, Sascha Becker and Carlos Noton for fruitful discussions, interesting comments and suggestions. A special thanks goes to my colleague Michail Rousakis for useful suggestions and comments on this dissertation. I would also like to extend my gratitude to all the participants at Warwick's Public Economics and Political Economy seminars, the CAGE Applied Work in Progress workshop and the Lunchtime Seminar Series. I gratefully acknowledge financial support from the A.G. Leventis Foundation and the University of Warwick.

In particular, I would like to thank my friend and coauthor, Dimitrios Xefteris, with whom I have coauthored a part of this dissertation (Chapter 2) and from whom I have benefited a lot, since he acted as an external supervisor for that chapter. I am also very grateful and indebted to Sevinç Bermek for her constant support, patience and encouragement during this process. Finally, I would like to thank my parents and my siblings for their support and understanding and for being a constant source of inspiration to me.

Part I

Part A: The Economic Origins of Party-Systems

Chapter 1

Introduction

This dissertation explores, both theoretically and empirically, the economic origins of party-system structure, electoral competition and political participation via a model of redistributive politics. Its primary focus will be to formalize the relationship between economic conditions, institutions and the fragmentation of the party-system[1]. Furthermore, the exploration of the link connecting economic conditions with political outcomes will also shed some light into the critical role that institutional checks and balances play in determining the political landscape and the nature of electoral competition by shaping electoral behavior. As a result, this dissertation aspires to complete the bidirectional relationship between economic and political outcomes and document the effect of economic institutions (e.g. redistributive mechanisms) and institutional constraints (e.g. fiscal rules or balanced-budget constitutional provisions) in changing the structure of the party-system.

In their recent book "*Why Nations Fail?*", Acemoglu and Robinson (2012) note

[1] We adopt the standard convention in the literature (e.g. Persson & Tabellini, 2007) and we measure party-system fragmentation in a way analogous to market fragmentation, using an adjusted Herfindahl-Hirchman Index (HHI) where we replace market shares with parties' vote shares. As a result, party-system fragmentation measures the dispersion of elctoral power among political parties.

that: "Extractive rules are self-reinforcing. In the Spanish New World, plunder and economic malaise further empowered the elite. [...] Inclusive economies [...] succeed in keeping economic and political power dispersed". It is exactly this part of the relationship that runs from economic institutions to political outcomes, as measured by the dispersion of electoral power among political parties, that this dissertation will try to address. In fact, it will uncover the opportunistic incentives of dominant parties which, in the absence of institutional constraints, would be tempted to use the redistribution mechanism in order to capitalize electorally on the most needy of the voters (e.g. unemployed) and consolidate their political dominance.

The motivation for this dissertation came from empirical evidence and observation of how actual party-systems in industrialized democracies operate. Clearly, the structure of the party-system and the nature of political competition are key determinants for an array of important issues such as political stability and economic prosperity (Acemoglu & Robinson, 2000; 2006), institutional design[2] and choice (Colomer, 2005; Matakos & Xefteris, 2010) or welfare, civil order and conflict (Esteban & Ray, 2011). Moreover, electoral participation and voter turnout are among the most important determinants of democratic performance, legitimacy and quality of political institutions (Powell, 1982 & 1986; Jackman, 1987; Blais, 2006). Hence, the observed variation in the degree of electoral fragmentation and the level of voter turnout across different party-systems during the second half of the 20^{th} century, even among those ones that share similar economic, socio-demographic and political characteristics, poses some interesting questions.

In the remaining chapters, this dissertation will address some of them. In particular: Why do we observe such a big variation in the dispersion of electoral power and

[2] One of the most prominent institutions chosen within a party-systems is the electoral rule which, in turn, sets the rules of the game and determines political outcomes (Blais, 1991; Benoit, 2004)

in the number of political parties that dominate the electoral competition? What can account for this observed variation in the fragmentation of the party-system and the level of electoral participation, even among advanced industrialized democracies? Moreover, what is the role of economic conditions in explaining these phenomena? Is there a relationship between economic adversity, electoral fragmentation and voter turnout? And if so, through which mechanisms and links do economic outcomes, such as unemployment, influence electoral competition and participation? Can *re-distributive politics* and *economic* (opportunistic) voting provide an explanatory link? Finally, what is the role of economic institutions and institutional constraints? The detailed answer to some of those questions will be the main focus of Chapters 2 and 3.

So far, a large amount of scholars has extensively studied the impact of political institutions on economic outcomes (e.g. Barro, 1996; Alesina, 1987; Alesina & Roubini, 1992). The second chapter of this dissertation departs from this strand of literature, being one of the first to explore systematically the economic origins of party-system structure. It will also propose a formal mechanism that links economic conditions to political outcomes. More precisely, it will examine the impact of unemployment and public spending on the distribution of electoral power among political parties via redistributive politics. To do so, we employ a four-party rational choice model of electoral competition which takes place in two dimensions: economic policy (redistribution) and ideology. Then, we test the predicted relationships on two different data sets. First, on aggregate electoral and economic data from twenty-three OECD economies during the period from 1960 to 2007. Then, on data from Greek national and local elections, exploiting the Greek sovereign debt crisis as a natural experiment (information shock) which altered economic expectations. As a result, we aspire to confirm our findings in multiple environments.

In the third chapter, using again data from Greek elections, we explore the relationship between economic adversity and electoral participation. We identify two links through which the economic crisis has impacted on voter turnout. A *normative* one (trust) and a *rationalistic* one (party-group linkages the rent-seeking behavior of voters). In the Appendix, we include various information on our data and their collection, the political context and the institutional set-up of our Greek case-study. There, we also prove our theoretical results and we present in greater detail our empirical findings.

Overall, this dissertation lays a theoretical and empirical framework that relates economic outcomes with political participation and party-system fragmentation. It also highlights the role of institutional constraints (e.g. fiscal and monetary policy rules) and economic institutions in determining its structure and the distribution of political power. Next, we describe in more detail the motivating ideas behind the two main chapters of this dissertation, coupled with a more extensive review of the literature.

1.1 Unemployment and Redistribution

Studying the interaction between economic and political outcomes is central to our understanding of political competition and party-system structure. Increased electoral fragmentation[3] (more dispersion of electoral power among parties) can be viewed as a sign of increased political pluralism, more power-sharing and democratic openness. This, in turn, can be an outcome of more inclusive economic institutions (Acemoglu & Robinson, 2006). But, at the same time, it can also constitute a sign of increased political tension, polarization and centrifugal forces operating within a so-

[3]Hereinafter the terms *electoral* and *party-system* fragmentation will be used interchangeably since the former has prevailed in political science whereas the latter in economics.

ciety (Esteban & Ray, 2011). Since welfare, social order and the quality of democratic institutions critically depend on political stability, the determinants of party-system fragmentation seem to matter a lot. A quick look at Figure B.1, reveals that electoral fragmentation varies considerably, even among the OECD countries which share similar economic and political characteristics.

The exact nature of the relationship between unemployment and electoral fragmentation seems to be a bit puzzling. Stylized evidence (Fig. B.1) seem to suggest a non-monotonic relationship between unemployment and electoral fragmentation across countries. Moreover, for low levels of unemployment the relationship is negative before taking the uphill, meaning that vote dispersion decreases with unemployment[4]. This latter observation might initially come as a surprise, since *retrospective* or *punitive* voting would predict a positive relationship between unemployment and support for marginal parties which entails higher fragmentation. It would appear more likely that voters tend to punish the big parties when unemployment is rising. Nevertheless, data suggest that something more than retrospective voting might be going on.

In order to account for this unexpected relationship, in the second chapter, we build a model of *economic* (opportunistic) voting where redistributive politics act as the key mechanism. We aim to answer the following questions: Can an increase in unemployment benefit electorally the dominant parties? If so, under what conditions? Without discarding the merits of retrospective voting, our model provides an answer to those questions and a comprehensive explanation for this *non-monotonic* relationship between unemployment and electoral fragmentation which traditional voting theories have, so far, ignored. In order to shed more light to this relationship

[4] An equivalent statement is to say that "the concentration of electoral power among parties is increasing with unemployment."

our mechanism focuses on the behavior of the unemployed voters and the opportunistic incentives of political parties and their promises. Our model predicts that the *dominant parties*[5] will always try to woo the unemployment voters who are "relatively more willing to switch their votes in response to more generous redistribution promises" (Dixit & Londregan, 1995 & 1996). The intuition is that for the poorest of the voters (unemployed) ideology is more or less a *luxury good* and economic considerations are more salient determinants of electoral choice. Hence, they are more likely to vote for the parties which can *credibly* promise and *deliver* more redistribution, financed through labor income or inflation taxes (monetary expansion).

This non-monotonic relationship is an outcome of *two* counter-acting forces. The initial decline in electoral fragmentation, as unemployment is low and rising, can be attributed to the following reason: the opportunistic (vote maximizing) behavior of dominant parties that use the redistributive mechanism in order to attract the vote of the unemployed who are more responsive to transfers promised by them. In the spirit of the models of redistributive politics (Dixit & Londregan, 1996; Larcinese et al., 2012) unemployed voters can be thought of as the *target constituency* of those parties (cheaper perfect substitute). Hence, the initial rise in unemployment increase the size of this target group of voters from which parties can fish for votes. Yet, as unemployment gets out of control, the revenue raising capabilities of the state are shrinking due to economic under-performance and a shrinking tax base. As a result, less funds are available for redistribution and any generous promise is no longer seen as *credible* since it cannot be financed. Therefore, the redistribution mechanism becomes impotent and the trend is reversed. Now, unemployment leads to more dispersion of votes and more fragmentation.

But for this argument to hold *two conditions* have to be met. First, an effective,

[5] By *dominant* we mean parties that have real chances of winning elections.

publicly financed, through labor income- or inflation-taxes, redistribution mechanism has to be in operation. Second, dominant parties must face low institutional *checks and balances* (e.g. independent Central Bank, fiscal and budget rules, bicameralism, fiscal federalism etc.) in their ability to utilize and finance this mechanism for own electoral benefit (e.g. print money or raise taxes to finance promises made to poor voters). That is, to put it the words of Larcinese, Snyder and Testa (2012), who find modest support for the conjecture that politicians will favor financially their core supporters, their findings "[M]ight reflect features of distributive politics that are particular to the US. Congress is one of the most powerful [...] legislatures in the world and guards control over the public purse. Committees are powerful [...] and give committee leaders [...] a substantial degree of independence from party leaders. Individual senators pursue their own re-election goals [...]. The federal structure [...] further complicates the situation. [...] As a result, the President may have relatively little influence over the distribution of federal expenditures. Perhaps, even though he would like to target [...] voters, he cannot". It is exactly this notion of institutional constraints that our model highlights. This can become more clear by looking at Figures B.3.a and B.3.b.

The intuition behind our argument follows a "carrot-and-stick" rationale. Unemployed voters have less economic means relative to employed ones. They are more responsive to redistribution because their *marginal rate of substitution* of income for ideology is relatively higher. That is, they are willing to sacrifice more in ideology for a given increase in income. An employed person who would have otherwise voted for another party, given the same ideological distance, is more likely to vote for a party promising redistribution once she becomes unemployed. Hence, the voting behavior of the unemployed is dominated by the economic dimension (carrot). Given

sufficient redistribution promises by dominant parties[6], unemployment acts like the stick that allows big parties to get more votes. Thus, ceteris paribus, they are more willing to vote for the dominant parties that can credibly promise and *implement* (upon assuming office) more generous redistribution. Even more so, when the public finances are healthy (or fiscal and institutional constraints are low) and allow for more generous redistribution.

This situation, where dominant parties exploit small increases in unemployment for own electoral benefit, clearly portrays the dilemma in which unemployed voters are caught. Instead of punishing the dominant parties for their policies that have led them into unemployment, they are more likely to vote for them since they are dependent on their transfers. That is, economic necessity dominates their voting decision. Hence, as the unemployment rate goes up, and as long as funds for redistribution are available, so does the vote share of dominant parties. Nevertheless, this argument has its limits. When unemployment gets out of control, the economy and the tax base shrink dramatically, thus making income transfers virtually impossible. Since dominant parties can no longer use redistribution to gain votes, those poor voters now have nothing to expect from them. Hence, they turn against them.

In the first place, our claim might sound a little counter-intuitive, given more traditional approaches of voting behavior. Yet, it is in line with rational choice theory. Moreover, its empirical documentation paves the ground to complete and revise the theory of political business cycles (Nordhaus 1975; Alesina et al., 1987 & 1992) in two directions: Firstly, it will complete the two-way relationship between economic and political outcomes. So far, in the existing literature (Barro 1996; Persson et al. 2007) the impact of political institutions, such as the electoral rule, on economic

[6] In our formal model, we do not assume that some parties are *ex-ante* dominant. Rather, dominant parties arise endogenously exactly because they rely more on transfers.

outcomes has been extensively studied and very well documented both theoretically and empirically. Nevertheless, the reverse direction of causality is understudied. Hence, this dissertation aspires to bridge this gap. Secondly, our model endogenizes partisan preferences over unemployment and redistribution in a way that the political business cycles theory did not capture.

More importantly, our mechanism can provide a *special interest politics* justification for redistribution. Acemoglu and Robinson (2006) show how *general interest* political considerations (e.g. avoiding a costly revolution) forced political elites to introduce more inclusive power-sharing political institutions that ended up expressing the median voter's preferences for more redistribution. In parallel with this point, our model highlights the *partisan*, opportunistic incentives that dominant parties have to exploit economic malaise (e.g. excess unemployment) and woo this "reserve army" of potential voters for own electoral benefits, by promising more generous redistribution. Especially in the presence of weak economic institutions and *low* institutional checks and balances, that place minimal limitations to the opportunistic behavior of dominant parties, a vicious circle might arise: dominant parties can capitalize on economic malaise to consolidate their rule by exploiting weak institutional constraints. This in turn, might lead to those dominant parties having more control and access over economic institutions (e.g. redistribution mechanism) which will further utilize to consolidate electorally. Thus, our work supplements Acemoglu and Robinson by pointing to an extra necessary condition for turning the vicious circle into a virtuous one: apart from inclusive economic institutions of power-sharing, at the same time, we also need strong institutional constraints in order to limit the access of dominant parties to those institutions. Otherwise, economic institutions that are meant to serve economic and political power-sharing can be exploited for partisan purposes and lose their original inclusive identity.

In order to verify the importance of constraints in increasing political power-sharing and electoral fragmentation, we use the data on Greek Elections. Here, we exploit the 2009-10 revisions[7] on the level of Greek public deficit for the 2006-08 period as an information shock[8] that generated *expectations* for large public spending cuts. The intuition is clear: the revelation of fiscal derailment and the resulting austerity measures imposed by the Troika acted as an exogenously imposed constraint that extinguished the ability of the big parties to credibly promise higher public spending in the future. These expected cuts severely weakened the strength of party-voter linkages and undermined the bipartisan foundations of the greek party-system, since there is not much left for the parties to promise anymore[9]. As a result, rent-seeking voters who are now less likely to vote for the *big* parties, ceteris paribus. Even more so in regions with larger public sector (linkages are stronger), since the bulk of the core constituencies of the two big parties is located there. This in turn, led to a record increase in electoral fragmentation in those regions, as evidence from Greek Elections suggest (Fig. B.10). This latter finding confirms intuition that economic adversity, acting as an exogenous constraint, and low public spending are associated with increases both in electoral fragmentation and polarization.

[7] As it can be seen in Figure A.1, Eurostat revised its estimates on the level of Greek public debt upwards, twice within a year (October 2009 and October 2010), and by almost 27% over the period extending from 2006-2010 of which 12% referred to the 2006 deficit.

[8] This second revision was due to the Greek Government's book-fiddling activity and misreporting of fiscal data for the whole period from 2006 to 2008. Since deficits were already there but remained concealed until their revelation at a later date (October 2010) by Eurostat, and prior to the 2010 Elections, we consider it as a pure information shock. This generated expectations for large scale public spending cuts which affected differentially regions with larger public sector size. This was reflected in the 2010 vote (Fig. B.10).

[9] In this particular case due to an exogenously imposed institutional constraint (the Troika bail-out agreement).

1.1.1 Literature Review

The idea of unemployment being used as a coercion or *discipline* device is not new in economics. Shapiro and Stiglitz (1984) apply this idea in the labor market. Yet, our application on political theory and voting behavior is quite new. Building on Tullock's assertion that "voters and buyers are essentially the same people", we move one step further and treat parties like firms that try to increase their vote (market) shares and dominate the electoral (market) competition. Therefore, we can paraphrase Marx[10] and hypothesize that big parties require "a reserve army" of (unemployed) voters in order to dominate in the political competition.

Political scientists have always been interested in examining the structure of the party-system and have adopted various approaches to describe it. Duverger (1954), first noted that the observed variation in party-system fragmentation among countries may be attributed to the particular political institutions that characterize the political environment of each state, the most prominent of them being the electoral rule. Duverger's first law asserts that "the simple majority, single ballot system favours the two-party system". That is, if a majoritarian electoral rule is applied then, we should expect a low level of electoral fragmentation. By contrast, his second hypothesis[11] suggests that "both the simple-majority system with second ballot and proportional representation favour multi-partism". Hence, when a proportional electoral rule is in place, fragmentation should be relatively higher. Individual voters are driven to vote for the larger parties in the first case, as a vote for a small party in a majoritarian system is seen as a lost vote. In a sense, this accounts to citizens voting strategically, since voting for a minor party that has minimal chances of wining may alter the election result in their disfavor.

[10] Karl Marx's initial quote was "Big industry constantly requires a reserve army of unemployed workers [...]"

[11] The division of Duverger's two statements into one law and one hypothesis is due to Riker.

Nevertheless, this approach does not account for the complete story. Looking again at the data (Fig. B.1), we observe the following paradox: countries with extremely stable electoral rules and solid party systems throughout their recent political history, like the United States, the United Kingdom, Germany and Sweden[12] exhibit a rather unexpected volatility in electoral fragmentation overtime. Interestingly enough, and contrary to Duvergerian predictions, countries like Greece, where changes in electoral rules have been frequent over the years and the party system is more fragile, exhibit significantly lower volatility in electoral fragmentation.

To address this issue, two strands were developed in the literature. Firstly, Colomer (2005) points out that the electoral rule itself might also be endogenously determined through some political processes. These in turn, might depend on electoral fragmentation. Secondly, political outcomes and electoral fragmentation might also be linked with economic outcomes. To the support of this claim there is a large and growing body of literature in economics. Several studies so far have attempted to relate political outcomes with macroeconomic variables. Alesina (1987), Persson and Tabellini (2003), Persson et al. (2007), Acemoglu et al. (2000, 2005 & 2006), and Barro (1996) have extensively analyzed the impact of institutions and other political indicators on the economic performance of a country. Specifically, Barro studies how political development and institutions affect economic performance and growth whereas, Alesina develops a rational expectations political cycles model, where partisan electoral competition affects unemployment and inflation.

More recently, Persson et. al (2007) examine the effect that the electoral rule has on government spending in parliamentary democracies. They conclude that electoral rules affect public spending indirectly through the fragmentation of the party

[12] The first two having a majoritarian electoral rule (first-past-the-post), with Germany having a mixed rule and Sweeden having a PR rule with a list.

system. They support that "proportional electoral rules induce a more fragmented party system". As a result, they are associated with a larger incidence of coalition governments, which in turn induce larger fiscal deficits than single party governments. In fact, their results are in line with the *Duvergerian approach*, since they suggest a link between electoral rules, the resulting party system fragmentation and economic outcomes.

Nevertheless, this approach explores the link between fragmentation and economic outcomes in only one direction. Namely, how the fragmentation of the party system affects public finances. As such, it cannot explain how economic outcomes might affect fragmentation. And even though the impact of political institutions and party-system structure on economic and political outcomes has been extensively studied, the reverse direction of the relationship has not been systematically documented. In fact, the impact of unemployment and redistribution on party-system fragmentation is a fundamental question that has not yet been thoroughly addressed. Therefore, our second chapter explores the reverse direction of the relationship between economic conditions and fragmentation.

The influence of economic variables on electoral outcomes and especially on incumbency has been studied by a large variety of scholars, especially in bipartisan systems (e.g. USA). Economic conditions are found to have a significant impact on determining the winner of an electoral competition, both at an individual (Fiorina 1981; Kinder and Kiewiet 1979, 1981; Kiewiet 1983) and at a country-level (Kramer 1971; Arcelus and Meltzer 1975; Bloom and Price 1975; Tufte 1978; Kinder Adams, Gronke 1989; Campbell 2000; Holbrook 2008). Nevertheless, the main focus of these studies was not that broad in the following sense: it might be informative on a partisan level, but it fails to capture whether economic conditions have an impact on the shape and structure of the party system itself. Moreover, they are silent with

respect to the mechanisms that drive this relationship, the centrifugal or centripetal forces that dominate the political system and the role of economic institutions and constraints.

This dissertation differs from existing literature in two respects. Firstly, it addresses the relationship between economic and electoral outcomes under a bi-directional prism. To this aim, we propose redistributive voting as an explanatory mechanism that links economic outcomes to political ones. Secondly, the scope of our study is more broad. We are interested in studying the impact of economic conditions on the structure of the party system, not just on the re-election chances of the incumbent[13]. For this reason, we focus on a broader definition of the electoral outcome: the fragmentation of the party-system. This is so, because electoral fragmentation can better capture the changes that occur in the structure of the party system and the distribution of electoral power. Finally, our study extends the results to a set of countries with multi-party systems. And given that the key economic indicator is the unemployment rate, we will attempt to account for the variation in electoral fragmentation caused by changes in unemployment.

[13]This is identical to the distinction between the sales and profits of a firm and the structure of the market as a whole.

Chapter 2

Unemployment, Redistributive Politics and Electoral Fragmentation

This Chapter documents, both theoretically and empirically, the existence of a *non-monotonic* relationship between the unemployment and party-system fragmentation. In fact, it will show that the variation in a single key economic variable, the unemployment rate, can account for much of the variation in electoral and party-system fragmentation, controlling for a set of relevant political, economic, institutional (e.g. electoral rule) and historical parameters. Furthermore, it also explores the link through which this effect operates. Applying a four-party model of *redistributive politics*, in the spirit of Dixit and Londregan (1996), it documents the importance of economic conditions as determinants of the party-system structure. Finally, it highlights the role of institutional checks and balances in shaping the political landscape. Section 2.1 presents the theoretical model. Section 2.2 tests its predictions on the OECD data set. Section 2.3 explores the role of institutional constraints in the

Greek case study, while Section 2.4 summarizes the discussion of this chapter and draws some useful conclusions.

2.1 Theoretical Model

We consider a model where electoral competition takes place among four parties[1], in a two-dimensional policy space. Following the literature (Stokes 1992; Groseclose 2007; Krasa and Polborn 2012), we will name the two dimensions *social*[2] and *economic* policies, respectively[3]. Following the literature (e.g. Krasa and Polborn 2010, 2012; Dziubinski and Roy 2010) we assume a differentiated candidate framework, where the four mixed- (office and policy) motivated parties differ in their *fixed*[4] social policy position, while in the second dimension (economic policy) they *strategically* choose a level of redistributive spending (and implied taxes) to maximize their vote share[5]. Moreover, the preferences of the voters in both dimensions will be *heterogeneous* (unemployed voters prefer more redistribution, whereas, the opposite is true for the

[1] In another version of the model, we allow for endogenous party-entry.

[2] A typical dichotomy in the dimension of social policies can be, for instance, libertarian vs. authoritarian policies or liberal vs. socially conservative ones (e.g. Groseclose 2007).

[3] Examples of the first dimension (social policies) may include policies such as: abortion, same-sex marriage or secularism. The second dimension may include policies such as: redistribution, taxation and government spending.

[4] Krasa and Polborn (2012) also assume that that parties' position on the social policy (social ideology in their terms) dimension is fixed. Yet our set-up is quite distinct, and quite richer in the following aspects: i) we have four parties competing in elections instead of two, since we are interested in studying electoral fragmentation (trivial for the two-party case); ii) In our framework parties have mixed motives (both policy and office motivated), while in theirs parties are only office-motivated; iii) our model allows for more complex institutional architechture (e.g. coalition governments as we discuss in the Appendix) and iv) we allow for voter heterogeneity in both dimensions (ideology and tax preferences). Also in the Appendix, we allow for the two dimensions of political competition to be interconnected.

[5] Krasa and Polborn (2010) consider a similar model of electoral competition where candidates "[...] are exogenously committed to particular positions on some issues while they choose positions for the remaining issues [redistributive spending]". Moreover, Dziubinski and Roy (2010) consider a model with exactly two dimensions where parties are commited in one dimension but have the freedom to (credibly) choose any position in the other.

employed ones)[6]. Finally, both dimensions consist of a *continuum* of policies[7]. In the economic dimension the promised level of redistribution will depend on the level of the tax rate, which is also chosen from a continuum. In the standard version of the model, we think of those two dimensions as being independent (an assumption maintained by Krasa and Polborn 2012). In the Appendix, we extend the model to allow for the two dimensions to be interdependent. That is, we assume that socially progressive or liberal parties (and voters for that matter) will be assumed to favor redistribution policies a little bit more. Since our main result does not depend on the relationship between the two dimensions, in our analysis we treat the two dimensions as independent, for expositional simplicity.

2.1.1 Political Parties

We can formally define the *social policy* space as follows:

$$\mathcal{P} = \{l, L, A, a\} \subseteq [0, 1] \text{ such that } l < L < A < a$$

where l is the extreme libertarian party, L is a moderate socially liberal party, A is a moderate socially conservative party and a is an extreme authoritarian party. We shall assume that a party's index $p \in \mathcal{P}$ coincides with its position on the social policy dimension. The *social policy* space is the normalized interval $[0, 1]$. In order to give more structure to our model we consider the symmetric case.

Condition 1 ***(Symmetry)*** *Parties l and a are positioned in the extremes of the social policy space, that is at $l = 0$ and $a = 1$. Parties L and A are symmetrically positioned at distance ϵ around the median. That is, at $L = 1/2 - \epsilon$ and $A = 1/2 + \epsilon$.*

[6] In fact, our results also carry through in the case where voters have *homogenous* preferences over government spending (everyone prefers high to low).

[7] In Krasa and Polborn (2010) all policy dimensions are binary. In Krasa and Polborn (2012) the bidimensional policy space is continuous, just like ours.

Each party's position in the social policy dimension is public knowledge (and fixed)[8]. Furthermore, each party will propose in the pre-election stage a level of redistribution, which also implies a tax rate, since the budget must be balanced and the total amount of redistribution transfers should always equal the total revenues raised through taxation. Formally, each party p proposes a tax rate t_p such that $t_p \in [0, \tau]$ and $\tau \in (0, 1)$. Clearly, a proposal of tax rate τ is associated with highest possible level of redistribution and vice versa[9]. Further assume that parties are rational vote share maximizers that are both policy and office motivated and derive utility from the policy that is implemented, as well as from the vote share that they receive. That is, they care about winning in order to implement their policy and also receive office rents (proportional to their vote shares). In contrast, the level of proposed redistribution affects their utility only *indirectly* by altering their vote shares. Formally, their utility function takes the following form:

$$V_p(\omega, v_p) = -|\omega - p| + v_p,\ p \in \mathcal{P}$$

where v_p is the vote share of party $p \in \mathcal{P}$, and ω is the policy that gets implemented by the winner (or winners), once the electoral result has been realized. For instance, if party L wins in the electoral competition it implements $\omega^L = 1/2 - \epsilon$. Given that ω is the social policy of the winner[10], it clearly depends on the resulting

[8] See e.g. Krasa and Polborn (2010, 2012) and also Dzuibinski and Roy (2010).

[9] An alternative and politically more desireable way for the parties to finance redistribution is by engaging in expansionary monetary policy (money printing), in which case t^p can be thought of as the rate of inflation tax (growth rate of monetary base) proposed by each party. One can define the growth rate of the monetary base g_M as follows: $g_M^p \equiv \frac{t^p}{1-t^p}$. Then, our analysis goes through, this time with parties choosing g_M^p. Hence, t^p can have an alternative interpretation: it is the implicit rate of inflation-tax chosen by the parties. Hence, the variable upper limit τ of t^p can be interpreted as the degree of toughness (or autonomy) of the cetnral bank. An independent bank, following tough anti-inflation policies, will only allow for a very low τ, which means that the ability of parties to propose generous redistribution financed through inflation-taxes is limited. That is, τ measures the degree of institutional constraints (e.g. fiscal or monetary policy rules).

[10] Clearly the identity of the winner(s) depends on the electoral and the institutional architecture of government formation. We postpone further discussion on those issues until the next section.

vote share allocation. Hence, we can formally define it as follows: $\omega(\boldsymbol{v}) \in [0,1]$, where $\boldsymbol{v}$ is the vector of vote shares (v_l, v_L, v_A, v_a). To conclude the discussion, we note that each party's *social policy* p, together with its *tax rate proposal* t^p (uniquely associated with a level of redistributive transfers) is party p's *political platform*, upon which citizens vote.

2.1.2 The Voters

We consider *two* groups of voters, each consisting of a continuum whose preferences over *social policies* (ideal points) are *single-peaked* and distributed according to a *uniform* distribution on the $[0,1]$ interval. That is, $x \sim U(0,1)$ in both cases. The two continua are *identical* in all respects apart from two: firstly, they can be of *unequal* size and secondly, citizens have *different* initial incomes. We assume that the first group of voters, of mass $q \in (0,1)$ will be the *unemployed* ones, whose income $m \in (0, M)$ is a fraction of the market wage M. The second group representing the remaining $(1-q)$ will be the employed ones, receiving income M.

As a result of different incomes, agents have differential preferences over taxation and redistribution. Employing a redistribution mechanism identical to that of Meltzer and Richard (1981), we can compute the total revenue raised, and transferred to the citizens in the form of redistributive transfers, when a party proposes tax rate $t^p \neq 0$. Otherwise, if $t^p = 0$, redistributive transfers are also zero. Then, if budget balance is satisfied with equality, the total revenue raised and transferred to each voter is given by the following expression:

$$T(t_p) = t_p \tfrac{[qm+(1-q)M]}{q+(1-q)},\ t_p \in [0,\tau] \text{ such that } \tau \in (0,1)$$

Given initial income $y \in \{m, M\}$, with $m \in (0, M)$, the utility of an agent with ideal policy x and income y (we name this voter $\{x, y\}$) is given by:

$$U(\omega, x, y) = -|\omega - x| + f(y + T(t_\omega)),$$

where $T(t_\omega)$ is the transfer proposed by the winner, denoted as ω. The first component of this expression, $-|\omega - x|$, is the utility that voter x receives from the ideology of the winner. The second component, $f(y+T(t_\omega))$, is the utility that voter $\{x, y\}$ receives from her initial income y, plus the received transfer amount $T(t_\omega)$, given the proposed tax rate t_ω of the winner. We assume that $f(\bullet)$ is a continuous, strictly concave, monotonically increasing and twice continuously differentiable function with $f'(\bullet) > 0$ and $f''(\bullet) < 0$.

Then, the resulting utility of income for an unemployed voter, given transfer $T(t_\omega)$, is given by:

$$f\left(m(1 - t_\omega) + qmt_\omega + (1 - q)Mt_\omega\right) = f\left(m + (1 - q)(M - m)t_\omega\right) > f(m)$$

whereas, for an employed one it is:

$$f(M(1 - t_\omega) + qmt_\omega + (1 - q)Mt_\omega) = f(M - q(M - m)t_\omega) < f(M)$$

Since the LHS of both inequalities is income after redistribution, while the RHS is income when redistribution is zero, we can deduce that by monotonicity of $f(\bullet)$ *all* unemployed voters prefer the highest possible tax rate τ since redistribution takes place in their favour. On the contrary, employed voters have no preference for redistribution and strictly prefer zero taxes[11]. Hence, a party proposing a positive tax rate τ will be getting the votes of the unemployed at the cost of losing votes from the employed.

[11] This formulation of preferences, within each group, is exactly equivalent to Groseclose's (2007) "one-and-a-half dimensional" preferences where "alternatives are described by two characteristics: their position in a spatial dimension, and their position in a good-bad [high-low tax rate] dimension, over which voters [of the same group] have identical preferences."

An interesting point to note is that, given the proportional taxation scheme, parties will always have an incentive to propose a *strictly positive* tax rate and capture the votes of the unemployed, even when there are few of them. The intuition is the following. First, due to the diminishing marginal utility of income, unemployed voters are more responsive to generous redistribution. In fact, social policy is like a luxury good for them (the marginal rate of substitution of income for social policies is relatively higher for an unemployed voter). Second, a very high nominal tax rate (t) does not always imply very aggressive redistribution. In fact, whenever unemployment (q) is very low, even for extremely high values of t, due to the proportional redistribution scheme, redistribution from the employed towards the unemployed will be extremely mild (the term $q(M-m)t_\omega$ will be close to zero)[12]. Hence, the trade-off always works in favor of those parties that target the unemployed voters by proposing more redistribution. Then, one might ask the following question: Why don't we observe all parties making identical tax proposals? The answer to this is can be found to the strategic behavior of some parties who try to manipulate electoral competition and alter the outcome by bringing it closer to their ideal point. We will come back to this point in the next section. First, we want to formally state and discuss our main result.

2.1.3 The Voting Game

We consider a voting game with three stages. Ballots are *secret*. All information is publicly available and known *ex ante* to all agents. The equilibrium solution concept we employ is Nash. The three stages of the game are as follows:

Stage 1: Parties announce simultaneously their complete *political platforms*

[12] To see this, check that for $q = 0$, or for $q = 1$ for that matter, redistribution will always be zero, even if $t = 1$.

$\{p, t_p\}$. Since t_p is the only strategic choice made by parties, we can rewrite their maximization problem as follows[13]:

$$\max_{t_p} V_p(t_p, t_{-p}) = -|\omega(\boldsymbol{v}(t_p, t_{-p})) - p| + v_p(t_p, t_{-p})$$

The winning party is denoted by ω. Clearly, the winner depends on the allocation of vote shares among parties, which in turn depends on the tax-rate proposal t^p. Hence, we can express the winner of the electoral game as $\omega(\boldsymbol{v}(\boldsymbol{t}))$. Formally, we have $\omega(\boldsymbol{v}(\boldsymbol{t})) \in [0, 1]$, where $\boldsymbol{v}$ is the vector $(v_p)_{p\in\mathcal{P}}$ and $\boldsymbol{t}$ is the vector $(t_p)_{p\in\mathcal{P}}$.

Stage 2: Voters vote *sincerely* for their most preferred platform[14], given parties' tax rate announcements. Formally, sincere voting in this setup means that each voter $\{x, y\}$ solves the following maximization problem:

$$\max_{p\in\mathcal{P}} U(p, x, y) = -|p - x| + f(y + T(t_p)).$$

Stage 3: Given voters' choices at *Stage 2*, each party receives its vote share $v_p \in [0, 1]$ such that $\sum_{p\in\mathcal{P}} v_p = 1$, and the voting outcome is realized. The party that collects most votes wins the electoral competition and is called upon to form the government and implement its political platform. In case of ties, parties do so with equal probability. We assume commitment. That is, the winner fully implements its tax (transfer) announcements.

Since we make no reference to coalition government formation here, we are implicitly assuming that the electoral rule is simple plurality (or FPTP). In the Appendix,

[13]Given that in the social policy dimension the position of each party p is fixed, we can save in notation by omitting p from $\{p, t^p\}$.

[14]Benoit et al. (2011) make a distinction of 'sincere' voting into *expressive* and *simple*. They find experimental evidence that in large representative elections where voters have heterogeneous preferences they tend to vote sincerely (simple voting). It is this concept that we utilize here, although in our set up expressive voting would *not* produce different outcomes.

we examine in more detail the case of more complex institutional architectures (coalition governments and proportional rule) and we briefly discuss why our main results are not affected by allowing for those changes[15]. Here, we only stress in advance something that will become obvious as we solve our model: the choice of rule has no effect on the policy outcome, the equilibrium characterization and the comparative statics analysis that follows. The reason is that, as Groseclose (2007) demonstrated, "when voters' preferences are single-peaked and concave over the first dimension [social policy], majority rule is transitive, and the majority's preferences are identical to the median voter's." We show that in our model the outcome of simple plurality coincides with that of the majority rule. Hence, there is no need for further worry.

Clearly, the electoral outcome depends on the positions of the four parties in the social policy space and on their tax rate (redistributive transfers) proposals. Since parties ultimately choose t^p, and all that voters do is to vote *sincerely* for the party whose proposed tax rate t^p in conjunction with its social policies maximize their utility, there is *only one* dimension of *strategic competition* among parties. Finally, to conclude the discussion, we will now define our variable of interest. Given $v_p \in [0,1]$, for every $p \in \mathcal{P}$ and following Rae (1968) and Laakso and Taagepera (1979) we can define electoral fragmentation as an inverse Herfindahl-Hirchman Index:

$$F(\boldsymbol{v}) = 1 - \sum_{p \in \mathcal{P}} (v_p)^2$$

2.1.4 Results

In this section, we present our main results. In fact, we will show that for relatively mild assumptions, the game has a *unique* and *symmetric* pure-strategy NE. Since

[15] In the case of proportional rule and coalition government the implemented policy is a weighted average such that $\omega = \frac{\sum_{p \in \mathcal{C}} (v_p * p)}{\sum_{p \in \mathcal{C}} v_p}$, where $\mathcal{C}$ is the set that includes the coalition parties.

the main purpose of this chapter is to study how economic parameters affect electoral fragmentation, equilibrium uniqueness can provide the necessary framework to perform a comparative statics analysis. To prove our main result, we construct our argument in two steps. First, we show how parties' vote shares vary with the chosen tax-rates for all possible values of the parameters. Then, we show uniqueness by highlighting the strategic behavior of the extremist parties. Before presenting the results, we define a symmetric equilibrium.

Definition 2 *An equilibrium is symmetric if and only if parties play mirror strategies. That is, both conditions have to be satisfied: (i)* $t^l = t^r$ *and, (ii)* $t^L = t^R$.

We also denote a useful function that measures the maximum gain in votes for a party, as a function of unemployment (q) and its tax rate (redistribution) mark-up with respect to one of its neighboring parties. Define the tax rate mark-up for a party p as $\hat{t}_p \equiv t_p - t_{-p}$[16]. Also, to spare on notation, define $(1-q)(M-m) \equiv \delta$ and $q(M-m) \equiv \gamma$ and let $\hat{m} \equiv m + \delta t_{-p}$ and $\hat{M} \equiv M - \gamma t_{-p}$. Then, for every $q, \hat{t} \in (0,1)$ and every m and M, such that $m \in (0, M)$ define:

$$z(q, \hat{t}_p) \equiv \underbrace{q\left[f(\hat{m} + \delta\hat{t}_p) - f(\hat{m})\right]}_{\text{Vote Gains from Unemployed}} - \underbrace{(1-q)\left[f(\hat{M}) - f(\hat{M} - \gamma\hat{t}_p)\right]}_{\text{Vote Losses from Employed}}.$$

Then, the following Lemma will help us to shed some light on the equilibrium behavior of the parties vis-à-vis their choice of strategies (tax rates).

Lemma 3 *The following statements are true: (i)* $z(q, \hat{t}_p)$ *is continuous in* $[0,1]$ *and differentiable in* $(0,1)$ *for every* $q, m, t_{p,-p} \in (0,1)$*; (ii)* $z(q, \hat{t}_p)$ *is positive iff* $\hat{t}_p > 0$

[16] For instance w.l.o.g, one can define $\hat{t}_R \equiv t_R - t_r$ the differential between t_R and t_r or alternatively, we can define $\hat{t}_r \equiv t_r - t_R$. Clearly if we have that $t_R = \tau$ and $t_r = 0$ then, obviously $\hat{t}_R = \tau$ while $\hat{t}_r = -\tau$.

(i.e. $t_p > t_{-p}$*)* $\forall\ p, -p$ *and* $t_p, t_{-p} \in (0,1)$*; and (ii)* $\partial z(\cdot, \hat{t}_p)/\partial t_p > 0$ *for all* t_p *and* $\forall q, m$.[17]

In figures B.7.a and B.7.b we offer a graphical exposition of Lemma 3, for $f(y) = \sqrt{y}$. Clearly, $z(\bullet)$ is strictly increasing with respect to $\hat{t}$, and positive whenever party p proposes higher redistribution (taxes). It is also bounded[18] above and below (see Fig. B.7). Hence, Lemma 3 highlights the incentive that parties have to target the unemployed and go for redistribution. The first component is the gain in votes from the unemployed voters for a party proposing excess taxation $\hat{t}_p$, compared to its opponent's proposal. The second part captures the loss in votes from the employed voters[19]. Since $z(\bullet, \hat{t}_p)$ is always positive whenever $t_p > t_{-p}$, it can be interpreted as the net gain in votes for party p as a result of its tax rate mark-up. In the previous section, we have provided some intuition as to why a party can gain more votes if it proposes a high tax rate, even for low levels of unemployment. We postpone further discussion until the next section. First, we state our main characterization result.

Proposition 4 *For every* $q \in (0,1)$*, every* $m \in (0, M)$ *and every* $\tau \in (0,1)$*,* $\exists\ \hat{\epsilon} \in (0, \frac{1}{2})$ *such that* $\forall\ \epsilon > \hat{\epsilon}$ *the following vector* $\boldsymbol{t}^* = (t_l^*, t_L^*, t_A^*, t_a^*) = (0, \tau, \tau, 0)$ *constitutes the* ***unique*** *Nash equilibrium of the electoral game and induces the following policy outcome:* $\omega(\boldsymbol{v}(\boldsymbol{t}^*)) = \frac{1}{2}$ *(median).*

Our first result simply says that for a large range of values for ϵ, it always exist a unique and symmetric Nash equilibrium in pure strategies such that the two moderate parties propose the highest possible tax rate τ while, the two extremists propose zero tax. The resulting vote share allocation is symmetric, with the two moderate

[17] All Proofs in the Appendix.

[18] To identify upper and lower bounds we used approximation techniques in `Matlab`.

[19] Clearly $\delta \hat{t}_p$ measures the net income transfer to an unemployed voter, due to taxation, whereas $-\gamma \hat{t}_p$ measures the net income transfer to an employed one.

parties sharing first place, and the median policy is implemented. For values of $\epsilon < \hat{\epsilon}$ an equilibrium in pure strategies does not exist (see Fig. B.15). Fortunately, Proposition 8 (Appendix B) generalizes our equilibrium characterization for the case of mixed strategies and guarantees the existence of a symmetric equilibrium in mixed-strategies for *almost all* values of ϵ.[20]

In any such mixed-strategy equilibrium $\boldsymbol{\sigma}_\epsilon(\boldsymbol{t}^*)$ the tax-rate proposal of the two extremist parties is (in expectation) strictly less than that of the two moderate ones. Since, even for $\epsilon < \hat{\epsilon}$ we still have that extremist parties are choosing lower taxation (and less redistribution) than the moderate ones, our comparative statics analysis would yield identical results. The reason is that our comparative statics depend on extremist parties behaving strategically and proposing a *strictly lower* tax rate than the moderate ones.

Discussion of the Results

One interesting feature of our equilibrium is that *only* moderate parties will always go after the vote of the unemployed and propose the highest possible tax rate, even when unemployment is low. In the previous section, we have argued why parties would want to target the unemployed voters, regardless of the size of this target constituency. The reasons were: i) the proportional nature of the redistribution scheme, which means that a high nominal tax rate need not always imply an extreme income loss for the employed[21] (especially when unemployment is low, employed voters have almost nothing to lose) and ii) the relatively higher responsiveness of unemployed voters to economic transfers (diminishing marginal utility of income implies that, for the unemployed, the relative marginal rate of substitution of income

[20] In fact, Proposition 4 is a special case of Proposition 8 where all parties choose degenerate strategies with $\sigma_L^*(t_L = \tau) = \sigma_R^*(t_R = \tau) = 1$ and $\sigma_l^*(t_l = 0) = \sigma_r^*(t_r = 0) = 1$.

[21] Recall that the effective tax levied on employed voters (redistribution in favor of the unemployed) also depends on q, apart from the nominal tax rate t.

for ideology is larger). Since every vote counts the same, and given fixed resources available, parties always have an incentive to redistribute them in a fashion that targets the unemployed (cheaper perfect substitute)[22]. Hence, moderate parties are pursuing a redistribution policy for purely opportunistic, vote-maximizing reasons (*special interest politic*s for redistribution).

Then, the question is why extreme parties do not follow the moderates in pursuing the same vote-maximizing strategy and promise high redistribution. The answer lies in the strategic behavior of the two extreme parties: if they propose high redistribution they will be "shooting themselves in the foot" by reducing the vote shares of their sister-parties, thus adversely affecting the implemented social policy. In fact, what appears to be a cost-less promise changes the equilibrium outcome to their disfavor and causes a less desired party to win with certainty. That is, extreme parties face a trade-off between their office motivation (which dictates vote-maximization and high redistribution promises) and their policy motivation which triggers their strategic behavior in an attempt to manipulate the electoral outcome and the implemented social policies. by implicitly colluding with the party that is[23].

In fact, our model delivers a great deal of realism and highlights a trademark characteristic of multi-party electoral competition. It can explain why we observe some implicit collusion between parties that are closer to each other in the *social policy* dimension, even under the most competitive conditions found in a multi-party system. That is, we show how extremist parties strategically choose to "specialize" on the social policy dimension of their agenda by not attempting to woo the unemployed

[22] Recall that the function $z(q, \hat{t})$ is strictly increasing in t_p and positive for every q. Figure B.14 compares the utility of a moderate party proposing the highest tax-rate τ with its utility from a deviation to $t_p = 0$. Clearly, for every $q \in (0, 1)$ the moderate party is better-off by proposing the high tax-rate.

[23] The same incentives for strategic behavior and an analogous trade-off are also present in the case of coalition government formation, as we exhibit in the Appendix. Figure B.15.a represents this trade-off graphically

via redistribution[24]. As a result, our model highlights the key trade-off between vote maximization, which induces more intense competition, and policy motivation (strategic behavior), which induces tacit collusion that *cannot* completely eliminate competition.

2.1.5 Main Comparative Statics Results

After this brief analysis of our equilibrium, we proceed by presenting our main comparative statics results. That is, we will examine how electoral fragmentation varies with changes in unemployment and redistribution. Hereinafter, for expositional simplicity, we assume $\epsilon > \hat{\epsilon}$. First, we compute the electoral fragmentation index $F(\boldsymbol{v}) = 1 - \sum_{p \in \mathcal{P}} (v_p)^2$, as a function of the vote share allocation that corresponds to the symmetric equilibrium of Proposition 4. Recall that:the induced vote share allocation vector $\boldsymbol{v}(\boldsymbol{t}^*) = (v_l^*, v_L^*, v_R^*, v_r^*)$ takes the following form:

$$v_L^*(\boldsymbol{t}^*) = v_R^*(\boldsymbol{t}^*) = \tfrac{1}{4} + \tfrac{\epsilon}{2} + \tfrac{1}{2}\left[z(q,\tau)\right]^{25}$$

and

$$v_l^*(\boldsymbol{t}^*) = v_r^*(\boldsymbol{t}^*) = \tfrac{1}{4} - \tfrac{\epsilon}{2} - \tfrac{1}{2}\left[z(q,\tau)\right]^{26}$$

Hence, we can compute:

$$F(\boldsymbol{v}) = 1 - 2[v_L^*(\boldsymbol{t}^*)^2 + v_l^*(\boldsymbol{t}^*)^2].$$

We can, then, rewrite F as a function of q, m and τ:

$$F(q,m,\tau) = 1 - 2\left\{\left[\left(\tfrac{1}{4} + \tfrac{\epsilon}{2}\right) + \tfrac{1}{2}z(q,\tau)\right]^2 + \left[\left(\tfrac{1}{4} - \tfrac{\epsilon}{2}\right) - \tfrac{1}{2}z(q,\tau)\right]^2\right\} =$$
$$= 1 - 2\left\{\tfrac{1}{2}\left[z(q,\tau)\right]^2 + \epsilon z(q,\tau) + (\tfrac{1}{4} + \tfrac{\epsilon}{2})^2 + (\tfrac{1}{4} - \tfrac{\epsilon}{2})^2\right\}.$$

[24] Rick Santorum's statement during his campaign reminds us this: *"I don't care what the unemployment rate is going to be. It doesn't matter to me. My campaign doesn't hinge on unemployment rates [...]."*

[25] By symmetry of equilibrium note that $\hat{t}_L = t_L - t_l = t_R - t_r = \hat{t}_R = \tau$ and hence, $z(q,\hat{t}_L) = z(q,\hat{t}_R) = z(q,\tau)$

[26] Again by symmetry $z(q,\hat{t}_l) = z(q,\hat{t}_r) = -z(q,\hat{t}_L) = -z(q,\hat{t}_R) = -z(q,\tau)$

For simplicity let $(\frac{1}{4}+\frac{\epsilon}{2})^2+(\frac{1}{4}-\frac{\epsilon}{2})^2=C$, a constant, so that F becomes:

$$F(q,m,\tau)=1-[z^2(q,\tau)+2\epsilon z(q,\tau)+2C].$$

Proposition 5 *Assume that conditions of Proposition 4 hold. Then* $\exists\ \tilde{q}$ *such that* $F(\tilde{q},\cdot)=0$ *and the following statements are true: (i) for* $q\in(0,\tilde{q})$ *the electoral fragmentation index* $F(q,\cdot)$ *decreases as the unemployment rate is increasing (that is* $\frac{\partial F(q,\cdot)}{\partial q}<0$*), ceteris paribus; and (ii) for* $q\in(\tilde{q},1)$ *the fragmentation index* $F(q,\cdot)$ *increases as unemployment increases (*$\frac{\partial F(q,\cdot)}{\partial q}>0$*).*

The indifferent voter among parties L and R is the median, due to the fact that the two moderate parties make the same redistribution (tax rate) proposals. Hence, the distribution of votes among the two moderate parties remains constant. As a result, the effect of unemployment on the fragmentation index comes through the shift of votes from the extremist parties (l and r) to the moderate ones (L and R). Therefore, changes in fragmentation capture the net changes in the party-system structure and the distribution of electoral power between moderate and extremist parties. Hence, we disentangle the incumbency effect (vote exchanges between the two moderate parties) from our effect (vote diffusion from the centre to the extremes).

The comparative statics results of Proposition 5 confirm our hypothesis for a non-monotonic relationship between unemployment and electoral fragmentation. Unemployed voters with lower initial income are more responsive to generous transfers. Given that in equilibrium, only the two centrist parties promise high redistribution, it follows that initially an increase in the unemployment rate will result in those parties increasing their vote shares (target groups gets larger). Yet, once unemployment gets out of control, the tax base shrinks dramatically (more voters are poor) and the ability to redistribute is severely undermined due to insufficient funds. In such a case, further rise in the unemployment rate results in less redistribution and

more fragmentation. Figures B.5.a and B.5.b, depict this non-monotonic relationship between unemployment and fragmentation.

Furthermore, our model can explain, via opportunistic motives, why different societies have different tolerance levels for unemployment. As shown in the proof of Proposition 5, $F(q,\cdot)$ is *non-monotonic* with respect to q. For every $q < \tilde{q}$, we have shown that $F(q,\cdot)$ is decreasing (i.e. $\frac{\partial F(q,\bullet)}{\partial q} < 0$), whereas the opposite is true for every $q > \tilde{q}$ (i.e. $\frac{\partial F(q,\bullet)}{\partial q} > 0$). That is, there exist $\tilde{q}(m,\tau)$ such that $F(\tilde{q},\cdot) = 0$ for all $m, \tau \in (0,1)$. In turn, $\tilde{q}(m,\tau)$ varies with m and τ. The following Corollary summarizes this relationship.

Corollary 6 *Assume that conditions of Proposition 4 hold. That is,* $\exists\ \tilde{q}(m,\tau)$ *such that* $F(\tilde{q},.) = 0$ *for all* $m, \tau \in (0,1)$. *Then, the following statements are true: (i)* $\frac{\partial \tilde{q}(m,\tau)}{\partial m} < 0$ *and, (ii)* $\frac{\partial \tilde{q}(m,\tau)}{\partial \tau} > 0$.

The above Corollary just states that the critical point $\tilde{q}(\bullet)$[27], after which fragmentation $F(\bullet)$ becomes an increasing function of unemployment, is increasing in τ and decreasing in m (see Fig. B.6.a). Hence,whenever the ability of governing parties to engage in redistributive transfers (by raising taxes) is limited, perhaps due to strict fiscal and monetary policy rules or institutional constraints (e.g. strong control of the legislature over the public purse), *ceteris paribus*, the party-system has a lower tolerance for unemployment (e.g. USA). This is so, because the critical level of unemployment ($\tilde{q}$), beyond which unemployment stops serving their opportunistic goals, is lower. Contrary to that, in societies where redistribution is more generous, perhaps due to lower constraints (e.g. politically controlled central bank) the tolerance for unemployment is higher (e.g. Greece).

Finally, our last result summarizes the relationship between electoral fragmentation and institutional constraints (redistribution). Here, we need to clarify that the

[27] We name this $\tilde{q}$ as the "tolerance level" of unemployment.

level of redistribution is endogenously determined through the choice of the tax-rate. The comparative statics exercise, therefore, refers to exogenous variations on the maximum rate τ that is allowed.[28]

Proposition 7 *Assume that conditions of Proposition 1 hold. Then, an increase in the permissible tax rate ceiling τ (redistribution) causes a decrease in electoral fragmentation $F(q,\tau)$. That is, $\frac{\partial F(\tau,\cdot)}{\partial \tau} < 0$, for all $\tau \in (0,1)$.*

This proposition says that as institutional constraints on economic policy are lifted and higher tax rates, leading to more redistribution are possible, the leverage that moderate parties (which are the only ones proposing redistribution) have on unemployed voters increases. Hence, so do their vote shares. This time, the relationship is monotonic. Figure B.6.b summarizes the relationships of Propositions 5 and 7 together.

2.1.6 Some Remarks

After presenting our main comparative statics result, a short comment with respect to the number of parties in our model (and the value of parameter ϵ) is in order. Expositional simplicity considerations aside, there is another intuitive reason, related with the desired nature of political competition. If $\epsilon \longrightarrow \frac{1}{2}$, this means that the two moderate parties are converging to the extremes in terms of ideology. In such a case, our four-party model becomes a standard two-party model where the study of fragmentation becomes trivial. On the other hand, if $\epsilon \longrightarrow 0$, the two moderate parties converge to the centre (and to each other). In this case as well, the study of electoral fragmentation becomes trivial[29]. In order to study how electoral fragmentation

[28] E.g. the degree of CB independence can determine the maximum level of *seignorage* or inflation-tax allowed.

[29] The two extremists are now indifferent between the two moderate parties. Hence, they prefer to promise high spending as well, leading to an equilibrium where redistribution (economic policy)

evolves when economic variables change we need a) multi-party political competition and b) differentiation among the redistribution promises of the parties. Hence, we only require that ϵ simultaneously satisfies both conditions. Luckily enough, we can guarantee that for *almost all* values of ϵ. We examine the non-symmetric case in the Appendix.

2.2 Empirical Analysis

In this section we test comparative statics prediction of our model summarized in Proposition 5: the *non-monotonic* (and initially *decreasing*) relationship between unemployment and fragmentation[30]. We will also present some evidence in the support of Proposition 7 (the role of institutional constraints). For this reason, we use aggregate political, socio-demographic and macroeconomic data for 23 western OECD democracies during the period from 1960 to 2007. Our hypotheses are:

Hypothesis 1 (Proposition 5): The relationship between unemployment and electoral fragmentation is non-monotonic (convex).

Hypothesis 2 (Proposition 7): An increase in the degree of institutional constraints results in more electoral fragmentation.

Our first hypothesis (*H1*) is a straightforward corollary of the model. We expect a *non-monotonic* (and convex) relationship between unemployment and fragmentation. That is, contrary to the traditional *protest voting hypothesis* that postulates a *monotonic* (and most importantly *positive*[31]) relationship between unemployment

dimension is practically cancelled-out.

[30] An implicit test of our proposed mechanism of redistributive politics (Proposition 1) is contained in the Appendix.

[31] It might not be straightforward why protest or retrospective voting theories would predict a monotonic and positive relationship between unemployment and fragmentation, especially in the

and support for marginal parties, we claim that electoral fragmentation initially declines with unemployment (and reaches a minimum), before taking the up-hill. Our second hypothesis (*H2*) is a re-statement of Proposition 7: more institutional checks and balances constrain the ability of dominant parties to engage in electorally motivated redistribution in order to gain more votes. Hence their vote shares decrease (and electoral fragmentation increases) with the degree of constraints.

Bringing the model's main predictions to data will be an interesting exercise. So far, there are few comprehensive and comparative empirical studies on the economic determinants of electoral fragmentation. Thus, our study is a first attempt to document systematically the economic origins of party-system fragmentation in western democracies. Of course, we need stress once more that this empirical study does not aspire to give a complete account on how (unemployed) citizens vote. Rather, we aspire to provide some evidence on the effect of economic variables, such as unemployment, on electoral fragmentation. Surely, unemployment is not the sole determinant of electoral fragmentation. Yet, we think that it is one of the most important ones.

---

case where protest voting implies punishing one dominant party by voting for the other one. In such a case the relationship between unemployment and electoral fragmentation might even be negative. Consider the following example: the two extremists each get 10% of the vote and the two centrists each get 40%. Then, protest voting might imply the following two cases: i) 10% for the extremists, 30% for the incumbent and 50% for the challenger or ii) 15% for the two extremists 30% for the incumbent and 40% for the challenger. Clearly, under case i), protest voting results in a reduction in electoral fragmentation (from 66 to 64), whereas in case ii) it results in an increase (from 66 to 70.5). According to our theory, fragmentation is expected to decline, like case (i), but via a different channel: the increase in the vote shares of the dominant parties (say from 40 to 45%) at the expense of smaller parties. Luckily, we can completely shut-off the first channel through which protest voting might operate (vote transfers between the two dominant parties) by re-estimating our models replacing electoral fragmentation with the sum of vote shares of the top-two dominant parties as our dependent variable. Thus, if protest voting was taking place our new dependent variable would have to either remain unchanged (case i), or move in the opposite direction than our prediction (fragmentation expected to increase and the sum of vote shares of the two dominant parties is expected to decrease from 80 to 70%). In fact, if one is to estimate our model using the vote shares of the top-two (dominant) parties as the dependent variable, our prediction is distinctly different from that of protest voting: we expect a concave (and initially increasing) relationship between unemployment and the vote shares of dominant parties (the mirror image of electoral fragmentation) whereas protest voting can only imply a decreasing (and monotonic) relationship, as explained above.

2.2.1 Data Description

For our empirical analysis, we have compiled a data set that contains observations of many political, socio-demographic and macroeconomic variables from twenty-three OECD states that are all consolidated democracies[32]. Our main source of data is *"The Comparative Political Data Set 1960-2007"* which is a collection of political, economic and institutional data[33]. It consists of a compilation of (mostly) annual data for 23 OECD states from 1960 to 2007. We have supplemented the data set with economic data retrieved from the *SourceOECD* Database[34] and with observations collected from the *OECD i-Library*, for reasons of consistency with the initial data. Data for oil prices were retrieved from OPEC and the *US Energy Information Administration* (EIA). Finally, data on parties' political positions and ideological proximity were taken from the *Comparative Manifesto Project* (DZW Berlin).

Our data are suited for cross-country, longitudinal and pooled time series analysis. We organize the data in a way that is suitable for a cross-national pooled time series analysis, using electoral years (not calendar) as our unit of analysis. The reason is that political, electoral and institutional variables (and most crucially our dependent variable, electoral fragmentation) only vary at election years. To deal with this complication we have decided to conduct our analysis at the *election year* (or *term*) level[35]. After aggregation, we are left with 322 observations at the election year (and term) level[36], out of 1,022 in total. For a complete description of the data set we refer

[32] As we will illustrate even in consolidated and industrialized democracies *redistributive (opportunistic) politics* can play an important role in determining electoral outcomes.

[33] Data have been assembled in the context of the research projects *"Die Handlungsspielräume des Nationalstaates"* and *"Critical junctures: An international comparison"* directed by Klaus Armingeon and funded by the Swiss National Science Foundation.

[34] In the cases of Greece, Spain and Portugal, political data were collected only for the democratic periods. Data for Greece are missing during the period 1967-1973. Data for Portugal are missing until 1975, and for Spain until 1976.

[35] The average electoral period (term) is close to 3 years. On average, we have 14 electoral contests per country in a period of 48 years.

[36] In fact, for large parts of our analysis, which we will clearly indicate, we conduct our analysis

the reader to the comprehensive list of all variables which is available in the online appendix. Finally, the data set contains some additional demographic, socio- and economic variables[37]. For a brief description of those variables we refer our readers to the OECD online database (*OECD i-Library*). Finally, following the literature we define our dependent variable[38], *electoral fragmentation,* as a Rae Index. Formally:

$$F_{i,t} = 1 - \sum_{n=1}^{N_{i,t}} (v_{n,i,t})^2,$$

where $v_{n,i,t}$ is the vote share of party n in country i at election year (or term) t, and $N_{i,t}$ is the total number of parties in country i that contested elections in year t.

2.2.2 The OLS Model

In order to test our two hypotheses, we estimate the following OLS model:

$$F_{i,t} = \beta_0 + \boldsymbol{\beta}_1 \cdot q_{i,t} + \boldsymbol{\beta}_2 \cdot q_{i,t}^2 + \beta_3 \cdot CONSTRAINTS + X'_{i,t}\gamma + a_i + \lambda_t + \eta_{i,t}$$

where the dependent variable $F_{i,t}$ is the index of electoral fragmentation in country i at election term t, $q_{i,t}$ is the unemployment rate for country i in election year (or term) t. Our explanatory variable, unemployment, is measured as a percentage of the total active labor force. We have included a quadratic term on unemployment to account for the non-monotonic relationship, suggested by the theory. According to our hypothesis, we anticipate $\beta_1 < 0$ and $\beta_2 > 0$ (convex relationship)[39]. Moreover,

at the election term level. That is, we average all economic data at the election term level (usually 3-year averages) so as not to discard valuable information.

[37] A few variables have been copied from a data set collected by E. Huber, Ch. Ragin, J. Stephens, D. Brady and J. Beckfield (2004), as well as from a data set collected by D. Quinn.

[38] As stressed before, in order to completely distinguish our theory from protest and retrospective voting theories we also employ an alternative dependent variable: the sum of vote shares of the top two (dominant) parties. We need to stress here that the identity of the two dominant parties need not necessarily be the same over time, even though in most countries the two dominant parties have remained unchanged for roughly the whole period under study.

[39] And if we replace fragmentation with the vote shares of the two top parties we expect a concave relationship.

$X'_{i,t}$ is the set of control variables (such as the proportionality of the electoral rule, the incumbency effect, the type of government, the number of parties contesting the elections, voter turnout and other economic and demographic controls). A key control variable included in the model is *CONSTRAINTS*, measuring the degree of institutional constraints[40] in using the public purse for opportunistic (electorally motivated) purposes. We expect $\beta_3 > 0$. Finally, α_i and λ_t are country and year fixed effects, respectively.

We have decided to include country specific fixed effects in all specifications. The main idea behind it is the fact that electoral outcomes and fragmentation might depend on time-invariant, country-specific characteristics (e.g. historical attributes of the political system, demographics, minority and ethnic parties etc.). Hence, in order to account for all these factors, we always use a fixed effects (FE) estimator. Our decision to also include year fixed effects requires some further discussion.

Since the aim of this study is to document the effect of unemployment on electoral fragmentation, the best way to do this would have been to exploit aggregate shocks on the economy. By doing so we would have been able to capture changes in unemployment that are beyond the control of domestic political competition[41]. Exploiting those exogenous variations in unemployment would have been ideal for the purposes of this study. Yet, a potential source of worry comes from the fact that voting behavior and as a result electoral fragmentation may also depend on year

[40] The *CONSTRAINTS* variable is the Index of institutional constraints of central state government according to Schmidt (1996); Minimum value=0; Maximum value=6; Range of data from 0 to 5, high values indicate powerful constraints, low values are indicative of a large maneuvering room available to central state government. Description: additive index composed of 6 dummy-variables ('1' = constraints, '0'=else) (1) EU membership=1, (2) degree of centralisation of state structure (federalism=1), (3) difficulty of amending constitutions/balanced-budget constitutional provisions (very difficult=1) (4) strong bicameralism =1 (5) central bank autonomy =1 (6) frequent referenda = 1. Source: Schmidt (1996: 172) transformed into time variant annual data. Data for central bank autonomy are taken from Beyeler (2007: 123). Period covered: 1960-2007. Missing: Greece 1967-1973, Portugal until 1975 and Spain until 1977

[41] For instance, international financial contagion could have been an ideal source of exogenous variation in unemployment.

specific *political shocks* that affect uniformly all western democracies[42]. Of course, the incidence of such political phenomena is more rare than that of aggregate macroeconomic shocks, which we ideally want to exploit. Nonetheless, we have decided to include year fixed effects in almost all subsequent specifications, knowing that this will also kill most of the variation in institutional constraints.

2.2.3 OLS Results

We first present our OLS results that serve as a benchmark. The main coefficients of interest are β_1, β_2 and β_3. Table B.1 presents our initial OLS estimates under five alternative specifications. Columns 1 and 2 simply check and verify Duverger's Law (1954) that simple majority and First-Past-The-Post electoral rules are associated with bipartisan systems and hence, lower levels of electoral fragmentation. The coefficient on *F-P-T-P electoral rule* is negative (range from -8 to -16.5) and statistically significant at any conventional level. Moreover, the coefficient on *CONSTRAINTS* is also positive (range from 1.8 to 1.1), under both specifications, providing evidence in the support of our second hypothesis (*H2*). These findings serve as a consistency check on the relevance of our data set. Note that in column 2 we introduce year fixed effects. Thus, it is normal to anticipate that this inclusion will eliminate much of the effect of institutional constraints. In columns 3 to 5 we introduce our key explanatory variable (unemployment and its square) to test *H1*. First, note that the coefficient on unemployment β_1 is always negative (range from -0.6 to -1) and statistically significant at any conventional level. At the same time, β_2 is also always positive (range from .02 to .03) and statistically significant under all alternative specifications, just as predicted by our theoretical model.

[42] Such examples are the fall of the Berlin Wall, or the 9/11 terrorist attacks, that can have an impact on partisanship and voting behavior (Kaplan and Mukand, 2011).

In addition, note that together with the quadratic term (Columns 3 and onwards) that accounts for the non-monotonic relationship, we include an interaction term between unemployment and institutional constraints to account for the differential impact of unemployment on fragmentation in party-systems that limit the excessive use of electorally motivated redistribution (see Corollary 6) via institutional checks and balances. As predicted by our theory, the coefficient is positive (range from 0.14 to 0.21) and statistically significant. The positive coefficient on the interaction term (roughly one-quarter the magnitude of β_1) can be interpreted as follows: the more institutional constraints a country introduces, limiting the ability of dominant parties to use the public purse for electoral purposes (e.g. by increasing the autonomy of the Central Bank), the more extremist parties get to benefit from an increase in unemployment, ceteris paribus[43]. This confirms our results on the varying "politically sustainable" levels of unemployment across countries (Corollary 6).

In summary, our OLS estimates constitute a first indication of a clear and statistically significant *non-monotonic* relationship between unemployment and party-system fragmentation. Since our study is among the first that uncovers a relationship that runs from unemployment to electoral fragmentation, there is hardly any theoretical or empirical evidence suggesting the existence of any kind of link running from electoral fragmentation to unemployment. As we have stressed extensively in the introduction, there is a large strand in the literature that documents how political institutions can affect growth and other economic variables (Alesina 1987; Barro 1996; Persson et al. 2007). To the extend that electoral fragmentation (as an aggregate index) carries some information on the structure of the party-system which,

[43]In our sample the critical point ($\tilde{q}$) seems to be around 15% for countries with *no* institutional constraints. If a country were to introduce some constraints (average value in sample is 2.5) then, the critical value becomes 8% (which roughly corresponds to the average long-run unemployment rate for the countries in our sample). That is, more constraints reduce the ability to manipulate redistributive transfers thus, reducing the *politically sustainable* level of unemployment.

in turn, might affect the choice of political institutions, the possibility that electoral fragmentation can affect unemployment cannot be ruled out completely, at least not without further theoretical and empirical exploration. Hence, despite the absence of any other theoretical or empirical piece of evidence suggesting a relationship from fragmentation to unemployment (and the fact that our theoretical model which we clearly believe postulates the opposite), we do not want to completely dismiss this possibility without further investigation. With this in mind, in the next section we introduce instrumental variable (IV/2SLS) models[44], using oil price shocks to instrument for exogenous (non-policy-induced) changes in unemployment, in an attempt to insulate our estimates from the possible presence of reverse causality.

2.2.4 Accounting for Endogeneity and OVB: Introducing Oil Price Shocks

As stressed above, a potential sources of worry with the OLS estimates is reverse causality (endogeneity). To address those concerns, we introduce *instrumental variables* in our econometric specification in order to estimate the causal effect of unemployment on electoral fragmentation. Ideally, one would like to find a suitable, that is, both valid and relevant instruments, to account for *exogenous*, non-policy induced changes in unemployment. Fortunately, we can use oil price shocks.

The idea of using oil price shocks as an instrument for unemployment is extensively discussed by Levitt (2001) who summarizes strategies for identifying the causal link of unemployment on crime[45]. In an other study, at the US states level, Raphael

[44] As a point of clarification, hereinafter with some abuse of terminology we use the term IV to characterize *only* the just-identified IV models with a single endogenous regressor and one instrument. All other models (e.g. overidentified models with a single regressor and multiple instruments, or models with two endogenous regressors and at least two instruments) are characterized as 2SLS models. Yet, all of them are estimated using the `ivregress` routine in `Stata` to avoid getting the wrong standard errors as a result of a two-step estimation process.

[45] The difficulty in identifying the causal effect of unemployment on crime is similar to ours due

and Winter-Ebmer (2000) argue that oil price shocks are relevant instruments for unemployment. But apart from Raphael and Winter-Ebmer, we also have good reasons for introducing oil price shocks as instruments for unemployment as stylized evidence suggest (Fig. B.4). To make the case for the suitability of our IV's, we first discuss the relevance of oil price shocks in affecting unemployment. Then, we make a brief comment on whether the IV satisfies the exclusion restriction, in order to be a valid instrument (we also report test results for the overidentified cases even though they do *not* constitute a direct test of the exclusion restriction *per se*).

Clearly, as many studies point out both at the theoretical (e.g. van Wijnbergen 1985) and at the empirical level (e.g. Keane and Prasad 1996; Blanchard and Gali 2007; Raphael and Winter-Ebmer 2000) oil price shocks can affect unemployment and the labour market, mainly through two channels: as adverse *supply shocks* and via the *real wage effect*. In the very short-run the supply shock in the goods market, caused by increased oil prices, dominates and causes unemployment to increase. Yet, in the medium and long run the labour market adjusts. The increase in the price level causes real wage to fall below the worker's productivity and hence firms are willing to employ more (net perfect substitutability between oil-intense capital and labour) and produce more, given demand[46]. This increase in investment and the *real wage effect* dominate over the medium-run and as a result, the effect of an oil price increase on employment (unemployment) is positive (negative). That is, the initial response to the shock driving unemployment upwards, is quickly reversed. Stylized evidence and empirical studies (e.g. Keane and Prasad 1996) confirm these findings. Hence, we conclude that oil prices are a relevant instrument for unemployment[47].

to reverse causality and unobserved policies that affect simultaneously both the crime rates and unemployment.

[46]Investment will increase and there will be excess demand in both labour and goods markets, especially for the economies that run current account deficits.

[47]For a more detailed discussion on the subject see also Appendix B.

Coming back to the exclusion restriction, the requirement is that oil price shocks affect electoral fragmentation only through unemployment, that is the vector of instruments $\boldsymbol{Z}_{it}$ is uncorrelated with the second-stage residuals η_{it} (implying $E[\boldsymbol{Z}_{it}\eta_{it}] = 0$). The main issue with the exclusion restriction is whether fragmentation and oil price shocks can be related via variables other than unemployment. For instance, an increase in the price of oil can induce different policy responses in countries with different levels of fragmentation and these policy responses may, in turn, affect unemployment. While this is clearly a possibility, our defense comes in three parts.

First, as Bernanke et al. (1997) note "[...] most of the observed movement in the instruments of monetary policy [...] is endogenous; that is, changes in policy are largely explained by macroeconomic conditions, as one might expect, given the Fed's *commitment* to macroeconomic stabilization." Moreover, they find that "[...] shocks to monetary policy explain relatively little of the overall variation (typically, less than 20 percent) in output [and employment]." As a consequence their findings do not support the view that changes in monetary policy responses are a primary cause of business cycles fluctuations. To put it more simply, "any case for an important role of monetary policy in the business cycle rests on the argument that the choice of the monetary policy rule (the "reaction function") has significant macroeconomic effects."

This brings us to our second point: in almost all OECD states Central Banks have a large degree of policy independence and autonomy, which insulates the bank's reaction function from the politicians' control. In addition, much of the output (and employment) stabilization takes place via automatic stabilizers (e.g. fiscal and Taylor rules) which are also beyond the political control of governments. As a result, it is very unlikely that policy responses to oil price shocks might be correlated with electoral fragmentation. And even if this was the case, it is still very dubious that

those policy responses have any important effect on unemployment (and the business cycle).

Finally, to further insulate our results we exclude from our sample all the oil producing countries (e.g. UK, Norway) and the US[48]. This addresses two other adjacent concerns: the *monotonicity* condition[49] and *reverse causality* (we need to make sure that fragmentation does not affect the shocks on oil prices). It is extremely hard to argue that changes in electoral outcomes in any *non-oil producing* small or medium-sized OECD economy can affect the price of oil. But, even if one's demand for oil depends on electoral fragmentation a single country's demand is still a negligible part of the aggregate world demand. Thus, we can be more sure that electoral fragmentation cannot affect oil prices[50], not to mention oil price shocks. For this reason, we conduct our analysis on a restricted set of countries. Overall, we believe that our IV is certainly a relevant and valid instrument satisfying the exclusion restriction. That is, the effect of oil price shocks on voting behavior and electoral fragmentation is coming solely through changes in unemployment[51].

[48] The US is excluded for a variety of reasons: as a large open economy and also an oil producer with significant oil reservesits its demand for energy might affect oil prices. Moreover, it has a bipartisan, presidential system so the study of electoral fragmentation becomes uninformative. Nonetheless, repeating our estimates are robust to sample size alterations and the inclusion of the US and other oil producers.

[49] In a world of potentially heterogeneous treatment effects, the IV may have no effect on some subjects, but all those who are affected should be affected in the same direction.

[50] There is a growing amount of empirical evidence that suggest that oil prices follow a pattern that is hardly affected by the voting behavior in any OECD economy (Pindyck, 1999; Barnett & Vivanco, 2003; Cashin et al., 2000; Engel & Valdes, 2000; Bartsch, 2006). Moreover note that in all specifications we use *lags* of oil price shocks that cannot be affected by *current* demand.

[51] A potential source of worry for the exclusion restriction would have been the case of the US, where anecdotal evidence suggests that oil prices have a direct effect on the winning probability of the incumbent. We provide a test that *invalidates* this claim in Table B.7 by estimating a reduced form equation of the effect of oil prices on the re-election probability of the incumbent.

Baseline 2SLS Model Specification

To predict the oil price shocks we estimate the following AR(2) model[52]:

$$P_{i,t} = \phi_{i,0} + \phi_{i,1} P_{i,t-1} + \phi_{i,2} P_{i,t-2} + u_{i,t}$$

where $P_{i,t-1}$ is the real (PPI-index) price of imported crude oil at refinery and $u_{i,t}$ is the residual of the AR(2) process. Since the literature (e.g. Blanchard and Gali 2007) suggest that the full effect of oil price shocks on the labour market materializes after Q.4, in some specifications we use more than one lag of the predicted residuals (oil price shocks) $\hat{u}_{i,t}$, weighted by the index of industrial intensity $w_{i,t}$ (constructed using OECD data on industrial production and employment) for each country i at year t. We define the vector of our instruments as follows[53]:

$$\boldsymbol{Z}_{i,t} = ((w \cdot \hat{u})_{i,t-1}, \cdots, (w \cdot \hat{u})_{i,t-n})$$

where $\boldsymbol{Z}_{i,t}$ is an $n$dimensional vector (with $n = 2$ for the just-identified model and $n \geq 3$ when the model is overidentified)[54]. Formally, we estimate the following 2SLS model:

$$\begin{pmatrix} q_{i,t} \\ q_{i,t}^2 \end{pmatrix} = \boldsymbol{b}_0' + \boldsymbol{b} \cdot \boldsymbol{Z}_{i,t}' + \boldsymbol{X}_{i,t}' \boldsymbol{\gamma} + \boldsymbol{\alpha}_i + \boldsymbol{\lambda}_t + \boldsymbol{\nu}_{i,t} \ (1^{st} \text{ stage regressions})$$

and

$$F_{i,t} = \beta_0 + \boldsymbol{\beta} \cdot \hat{\boldsymbol{Z}}_{i,t}' + X_{i,t}' \gamma + \alpha_i + \lambda_t + \eta_{i,t} \ (2^{nd} \text{ stage regression})$$

[52] The choice of an AR(2) process was dictated by the systematic and significant second-degree auto-correlation in the residuals that was observed. An AR(2) process is the best way to get a more precise estimate on the oil price shocks.

[53] We also employ more simple methods of estimation for our IV's (oil price shocks) that involve less complex or no indexation at all (in some cases we use simple real imported oil prices at refinery without predicting the residuals of an AR(2) process). We present those estimates in Tables B.3, B.4 and B.5. Since all of them are almost identical, we think that a more elaborate discussion on those alternative estimation techniques of oil price shocks is not warranted.

[54] Another reason to include multiple lags of the predicted residuals of real oil prices is associated with the fact that in some specifications we aggregate our data on unemployment at the electoral term level which usually contains information over the past 3 years. Hence, the use of at least 3 lags becomes imperative.

where $\boldsymbol{b}_0$ and $\boldsymbol{\beta}$ are 1×2 vectors, $\boldsymbol{b}$ is a $2 \times n$ matrix, $\hat{\boldsymbol{Z}} = (\hat{q}_{i,t}, \hat{q}^2_{i,t})$, $\boldsymbol{X}_{i,t}$ is a k-dimensional vector with the control variables[55], whereas α_i and λ_t are country and year dummies (FE) respectively. Contrary to popular wisdom, but in accordance with empirical literature (e.g. Keane and Prasad 1996) we expect $\boldsymbol{b} < 0$ (oil price increases were found to have a positive effect on employment[56] and thus, reduce unemployment in the long-run). Given that we use lags of weighted real oil price shocks, the long-run effect dominates[57]. Again the expectation is that $\beta_1 < 0$ and $\beta_2 > 0$. Results of this specification are presented in Tables B.2 and B.3.

Table B.2. presents the results of the baseline model (both for the full and restricted sample). Columns 1 and 2 refer to the full sample of countries. Column 3 is the benchmark[58] that we compare with the OLS estimates (Column 4). Columns 5 and 6 are the cases when we use non-weighted instruments (in column 6 the model is just-identified). As we can see, both β_1 and β_2 have the correct signs and are statistically significant even at the 1% level. Compared to the OLS estimates the coefficients increase in magnitude by four times (so do the standard errors as expected) and they range from -2.1 to -3.2 for the linear term (OLS range from -0.6 to -0.9). The same is true for the squared-term (.18). Moreover, the coefficient on institutional constraints is also positive in all the 2SLS specifications, large in

[55] We use the exact same controls as in the OLS specification with two exceptions: turnout and the coalition government dummy because they are outcomes that are either co-determined with fragmentation (e.g. turn-out) or determined afterwards (e.g. coalition government). Moreover, they are highly colinear with the number of parties and the electoral rule dummy (the probability of ending up with a coalition government is lower when majoritarian rules are applied e.g. Duverger 1954) two variables included in alla subsequent specifications.

[56] Keane and Prasad (1996) note: "We find that oil price increases result in a substantial decline in real wages for all workers [...]. The use of panel data econometric techniques to control for unobserved heterogeneity is essential to uncover this result, which is completely hidden in OLS estimates. While the short-run effect of an oil price increase on aggregate employment is negative, the *long-run effect is in fact positive*."

[57] Table B.6 summarizes the first stage results of our reduced IV model, presented in Table B.5. Our estimates on the impact of an oil price increase on unemployment are robust under all alternative specifications.

[58] The overidentified case with 2 endogenous regressors (unemployment and unemployment-square) and 3 IV's on the restricted sample.

magnitude (range from 2.2 to 1.8) and statistically significant (though not always at the 5% level[59]). Taken altogether, those estimates constitute a joint verification of our hypotheses (*H1* and *H2*). Furthermore, the reported J-test (Sargan) statistic on overidentifying restrictions (where applicable), fails to reject the null that the vector of our instruments ($\boldsymbol{Z}_{it}$) is orthogonal to the second-stage residuals (η_{it}) at any conventional level. Hence, our instruments are valid. Moreover, our 2SLS estimates are robust to various alternative specifications, as Table B.3 demonstrates[60]. In all cases our coefficient estimates are almost identical in magnitude (range from -3.2 to -3.3 for the linear term and from .25 to .2 for the squared term) and statistically significant at any conventional level.

Of special interest is the coefficient on the degree of institutional constraints which is always positive (ranging from 1.8 to 2.2) and statistically significant at the 5% level[61]. It can be interpreted as saying that conditional on a country exhibiting high institutional constraints (e.g. an independent central bank, tight monetary and fiscal policy rules, balanced-budget clauses in the constitution, fiscal federalism or bicameralism) that do not leave much room to dominant parties for electorally motivated (opportunistic) redistributive spending, the impact of unemployment on fragmentation via our mechanism of redistributive politics is mitigated. Exactly as we have hypothesized (H2) and in accordance with our model's prediction (Proposition 3) and stylized evidence presented in Figures B.3.a and B.3.b. Hence, more

[59] As we have explained before institutional constraints is a slow-changing variable and much of the variation is being subsumed by the use of country and year FE.

[60] In Table B.3 we introduce two important variations on the model's specification: we average the data at the electoral term level and we introduce a Lagged Dependent Variable in the model (LDV). We continue to estimate an overidentified model (3 lags). Column 1 in Table B.3 replicates Column 3 of Table B.2 with the inclusion of a LDV. In Column 6 we use lags of real imported oil prices (not the predicted shocks) as instruments, as robustness check.

[61] This is true only for the case of non-averaged data. As stressed in the previous section, introducing both country and year fixed effects eliminates much of the variation in this variable. On the top of it, if one also aggregates the data at the election term level the effect vanishes to a large extend.

institutional constraints induce more fragmentation (and less concentration of electoral power).

The only issue that still remains to be addressed is related to a well-known problem in the IV literature: weak instruments. Since in almost all specifications presented so far, we estimate an overidentified model (a choice dictated by the fact that we average our data at the electoral term level) our instruments appear to be relatively weak (as the F-statistics inform us). This is the case, even though our instruments are certainly relevant and have a clear economic interpretation (as Table B.7 with the reduced form regressions demonstrates). We attribute this fact to two reasons: the simultaneous inclusion of two endogenous regressors and the overidentification we impose to the model. We deal with those two complications in the section that follows.

2.2.5 Addressing Concerns of Weak Instruments: The Just-identified Model

The problem with the inclusion of many (potentially weak) instruments is that it tend to increase the bias of the 2SLS estimator towards the probability limit of the OLS estimates. To address this issue, we reduce the number of endogenous regressors to a single one (which reduces the requirement for an instrument to the bare minimum) and we follow two steps, common in the IV literature: we make use of alternative estimators (such as the *LIML* estimator) for the overidentified models (with multiple instruments) and we also estimate a just-identified model (in which case it becomes a standard IV model with one endogenous regressor and one instrument). First, we need to justify our choice to estimate a variant of our baseline 2SLS model using

only one endogenous regressor (the linear term on unemployment $q_{i,t}$)[62].

The technical reason for estimating a simplified version of our model should be clear by now. Since it is extremely challenging to find two distinct and valid instruments for the same variable and its square, we have resorted to the solution of using multiple lags of oil price shocks. This, together with the use of averaged data, generated concerns of weak instruments. Clearly then, reducing the number of endogenous regressors to just one and using our best available instrument is the most efficient way out of this situation. Nevertheless, one might question our decision to exclude the quadratic term from the estimated equation. If one adheres to our theoretical findings (as we do) then, certainly the relationship between unemployment and electoral fragmentation is non-monotonic. Why then exclude the quadratic term? Is there any intuitive justification apart from the technical one and how does it affect our estimates? Our answer comes in two parts. We believe that there is an intuitive justification and moreover, there is no need for extra worry, because the decision to go with only the linear term, in fact, strengthens our point.

First, note that the main contribution of this paper is to question the conventional wisdom (e.g. theories of retrospective and protest voting) on the effect of unemployment on electoral outcomes by uncovering an decreasing (increasing) relationship between unemployment and electoral fragmentation (the vote shares of dominant parties)[63]. The increasing part of this relationship, though an integral piece of the argument, could have been easily justified, even without invoking a model of redistributive politics[64]. Moreover, trying to estimate a *negative* linear re-

[62]Formally, we estimate: $q_{i,t} = b_0 + \sum_{n=1}^{m} (b_n \cdot \hat{u}_{i,t-n}) + \boldsymbol{X}'_{i,t}\boldsymbol{\gamma} + \alpha_i + \lambda_t + \xi_{i,t}$ and $F_{i,t} = \beta_0 + \beta_1 \cdot \hat{q}_{i,t} + \boldsymbol{X}'_{i,t}\gamma + \alpha_i + \lambda_t + \varepsilon_{i,t}$. Again, in some specifications we include a lag of the dependent variable (LDV).

[63]Recall that our second dependent variable (top two parties' vote shares) is the mirror image of electoral fragmentation.

[64]Simple theories of retrospective or protest-punitive can only explain why fragmentation (and the vote shares of the two dominant parties) increases (decrease) as unemployment rises, but not

lationship, instead of convex one, would result in significant *under-estimation* of our coefficient on unemployment (smaller negative value[65]), as Figure B.2.b shows. That is, excluding the quadratic term runs against us, since it makes it much harder to establish the first (decreasing) part of the relationship between unemployment and fragmentation. If we are still able to find a clear, negative and statistically significant relationship between unemployment and fragmentation, despite the fact that we are deliberately underestimating (in absolute terms) the value of β_1, this will strengthen our argument. Hence, the trade-off of estimating a simplified version of the model, in order to deal with the "weak instrument" issue, comes at a virtually zero cost.

IV Model: Results

Table B.4 compares the estimates of the overidentified models (with one endogenous regressor) using the LIML estimator with those of a standard 2SLS one. Table B.5 presents the results of the just-identified model with a single endogenous regressor. In all specifications, the coefficient on unemployment is negative[66] (range from -1.3 to -0.8) and statistically significant at least at the 5% level, albeit smaller in magnitude than our estimates on the baseline 2SLS model (Table B.3) as expected (recall we are underestimating β_1). From table B.4, where we compare the 2SLS and the LIML estimators (and continue to use data averaged at the election term level) one can see that the 2SLS estimates are slightly biased towards the OLS estimates, when compared with the LIML ones. Moreover, when the number of instruments included in the regressions increases from two to three (compare columns 1 with 3 and 7 with 8) the bias on the 2SLS estimates is larger (and the coefficient is closer to the OLS

the opposite as our theory predicts.

[65] Or smaller positive value when our dependent variable is the sum of vote shares of the two top parties.

[66] Positive when the dependent variable is the sum of vote shares of the top two parties, as expected, ranging from 2.2 to 4.9.

estimates) while the LIML estimates remain virtually unchanged (and statistically significant). Of course, this comes at the cost of the LIML estimates being a bit more imprecise (standard errors are larger) but not to the extend of being uninformative and causing worry[67]. Since in all specifications the 2SLS and the LIML estimates are quite similar in magnitude and informative we conclude that the relatively low $F-$statistic (ranging from 2 to 4.5) is not detrimental to our results.

Nevertheless, in table B.5 we present the IV estimates of the just-identified model (one endogenous regressor) where we use our single best instrument (the first lag). In columns 1 to 6 we estimate the model with electoral fragmentation as our dependent variable. In the remaining two columns, we replace it with the sum of vote shares of the two top (dominant) parties. In all specifications (with and without weights and using alternative versions of the instrument) our results are informative, statistically significant and in accordance with our predictions (the coefficient on unemployment is negative with range from -1.3 to -0.8). More importantly, the weak instrument problem is *completely* resolved. As one can observe, the first-stage $F-$statistic on the excluded IV is above the desired critical value($F > 10$), under *all* alternative specifications. Hence, we conclude that our instrument is not weak (as the F-score on excluded IV suggests) and clearly valid (as the Hansen/Sargan J-test statistic suggests). Moreover, our estimates are statistically significant and also very robust to model alterations, large in magnitude and thus, qualitatively important as well (one standard deviation in unemployment, roughly 4% can explain almost *two-thirds* of the variation in fragmentation, ceteris paribus). For a single economic variable, the effect is quite impressive and lends strong support to our hypothesis.

[67] Also note that, when compared with the IV estimates of the just-identified model in Table B.5 the LIML estimates seem to be statistically indistinguishable from the IV ones.

Discussion of Results

The importance of our empirical findings is dual. Firstly, our results yield support to our model of redistributive politics and its main underlying idea: Absent of institutional checks and balances, dominant parties can exploit the relatively higher responsiveness of the unemployed to generous redistribution in order to score electoral gains (opportunistic, special interest motivation for redistribution). Second, they verify the important effect of economic conditions on voting behavior, electoral outcomes and the structure of the party-system. Even though there are, of course, other factors (e.g. the electoral rule) that affect fragmentation the impact of unemployment seems to be very strong. If we also account for the effect of economic institutions (e.g. redistribution mechanism) then, it becomes clear that economic conditions are among the most prominent determinants of electoral behavior and party-system structure in industrialized democracies. Hence, our findings support the existence of a bidirectional link between economic conditions and political outcomes.

In specific, given our findings that a 1% increase in unemployment is causing an almost 3% decrease in electoral fragmentation, one can calculate that the "politically sustainable" level of unemployment for an average country in our sample is roughly 6-7%[68]. That is, when unemployment exceeds that level dominant parties are starting to pay the price and redistribution promises are not enough (or not seen as credible) in order to reverse this trend. One cannot escape from noticing the coincidence that the average long-run (steady-state) unemployment rate for the countries in our sample is 6.2%. That is, party-systems seem to operate close to the "opportunistically optimal" level of unemployment (for the big parties of course). Although we do not go as far as to suggest that big parties are deliberately exploit-

[68] For a country with average institutional constraints constraints.

ing higher unemployment, we note that our empirical findings pave the ground to complete and revise the theory of political business cycles (Nordhaus 1975; Alesina et al., 1987 and 1992) in two directions. First, by completing the two-way relationship between economic and political outcomes. Secondly, by endogenizing parties' preferences over unemployment[69] and redistribution we provide some reasoning as to why some parties of factions within parties (in our case the extremist ones) might favor fiscal discipline and the introduction of fiscal constraints over higher taxation or generous redistribution.

2.3 The Role of Institutional Constraints: The "Greek Case"

In the introduction we identified two conditions under which dominant parties can capitalize on the unemployed to score electoral gains and affect electoral fragmentation and the structure of the party-system. We have explored the first one (redistributive politics) both theoretically and empirically, in Sections 2.1 and 2.2. Here, in this section, we exploit the action of the greek government to fiddle the books and misreport the level of public deficit for the period 2006-2008 as a natural experiment[70], in order to analyze the second one: the importance of institutional constraints. Our aim is to demonstrate in more clarity our second necessary condition for unemployment to have an impact on electoral fragmentation: the role of institutional checks and balances in limiting the ability of dominant parties to engage in redistribution for electoral purposes (Proposition 7).

[69] For instance, in Alesina (1987) preferences over unemployment are assumed to be exogenous.
[70] For more details on the information shock that this action generated refer to Appendix A.1

2.3.1 A Shock on Information

Using data from greek local elections is the best empirical strategy to follow, mainly for two reasons. Firstly, the greek political system is characterized by long-lasting linkages between politicians and voters and lack of institutional checks and balances[71]. Secondly, and more importantly, the two step audit and revision of greek public finances that was published in October of 2009 and 2010 respectively, offers the opportunity for a natural experiment. The reason is that while the first revision was referring to the FY2009 public deficit, the second one was concerning the deficits accrued in the period from 2006 to 2008 and were previously concealed. That is, the second revision was a pure *information shock* that drastically changed the public's expectations on the state's and the local authorities' ability to engage in public sector expansion and extensive redistributive transfers for many years to come. A brief look at Figure A.1 helps clarifying the point. As we can see, out of the 12 percentage points of the second revision almost all referred to the "hidden" deficits of FY2006-2008. In fact, more than 80% of this revision was solely referring to the FY2006 deficit alone. Clearly then, this second upward revision, that occurred between two electoral contests, is not attributed to policies followed in 2010. Rather, it was already there but was not disclosed to the public and the markets earlier. That is why, we refer to this second revision as a pure *information shock* since it was back-dated as it had occurred at least three years ago. What was indeed new is the revelation of this new information that occurred just weeks before the November 2010 Elections. We present a brief time-line of events that lead to consecutive revisions of greek public finances in Appendix A.1. where it becomes more evident why we can exploit this *information* shock as a *natural experiment*.

[71] For more information on the institutional and political context of Greece refer to Appendix A.2

2.3.2 Data and Identification Strategy

Before presenting our key findings, we present our data and our identification strategy in detail. The data on regional electoral fragmentation were collected by the Greek Ministry of Interior and compiled by us. The final calculations of electoral fragmentation indexes are our own. The time span of the data in the sample runs from 1998 until 2010. This includes 8 electoral races (4 at the local level and 4 at the national), each taking place every four years. We have also supplemented our data on electoral fragmentation with a series of economic and socio-demographic variables at the NUTS-3 level[72] which we have retrieved from the Eurostat LFS Survey (2009) and the 2010 Regional Yearbook. In total we have 384 observations. The basic unit of analysis is a NUTS-3 region, of which Greece has 48. We also repeat our estimates for the NUTS-2 level. Since we do not get dramatically different results, we decided to focus on the NUTS-3 regions in order to have a larger sample size. From those 48, twenty-two NUTS-3 regions (or 6 NUTS-2 regions) that account for the 60% of the population are classified as High Public Sector Employment regions (quasi-treatment group), whereas the remaining twenty-six (or 6 at the NUTS-2 level) are categorized as our quasi-control group. In those regions the main sources or economic activity and employment are non-government related (e.g. tourism and agriculture). Table A.3, presents the key summary statistics for those regions.

As we have argued, the information shock will allow us to identify the effect of expected public spending cuts (constraints on redistribution) on fragmentation since the information shock altered voter's expectations on the states's ability to finance generous transfers to the voters and the local authorities[73]. But this shock

[72] NUTS stands for *Nomenclature Unitaire de Territoire Statistique* and is the basic unit for reporting regional statistics by the EU. There are three levels of regional sub-units. At the NUTS-1 level Greece has 2 regions (North and South), at the NUTS-2 level it has 12 regions and 48 at the NUTS-3 level, the smallest possible sub-unit.

[73] Most of the funding for Greek local administrations comes from the central budget and EU

affected disproportionately some regions as it appears to be the case, if one looks at Figure B.10. In order to measure the intensity of the effect across regions, we need to split Greek NUTS-3 prefectures into two groups: those with *larger public sector* size (and perhaps stronger and more persistent linkages) and others with lower. The identifying hypothesis is that we should expect to find a differential effect of spending cuts on electoral fragmentation in these regions. In fact, this is what we observe: the rise in fragmentation was larger in regions with higher share of public sector employment exactly because expected cuts in public spending and government job creation (an alternative form of redistributive transfers in clientelistic systems) are expected to be more deep there. Formally, we estimate the following model:

$$F_{s,t} = \alpha_0 + \gamma_s + \lambda_t + \boldsymbol{\beta}_1 (HighPS)_s * \lambda_{2010} + \sum_{\tau=1996}^{2009} \delta_\tau (HighPS)_s * \lambda_\tau + \boldsymbol{X}_{s,t} + \varepsilon_{s,t}$$

where $F_{s,t} = 1 - \sum_{n=1}^{N_t} (v_{n,s,t})^2$ is the index of electoral fragmentation at the regional (NUTS-3) level, defined as before, with N_t being the number of parties at electoral year t, and $v_{n,s,t}$ is the vote share of a party $n \in N$. Moreover, γ_s are region (NUTS-3) dummies, λ_t are electoral year dummies (i.e. λ_{2010} is the post info-shock dummy) and $HighPublicSector * \lambda_{2010}$ is the interaction dummy of interest. Finally, $X_{s,t}$ is the set of other controls (e.g. unemployment, local elections dummy, socio-demographic controls etc.). In some specifications we interact the control variables with the *High Public Sector* dummy in order to control for the possibility that some variables might have a differential impact on high public sector regions (heterogeneous treatment effects). Since we also introduce regional dummies (at the NUTS-3 level), electoral year dummies and the interaction terms $\sum_\tau \delta_\tau (HighPS)_s * \lambda_\tau$, our

funds. Local authorities in Greece have extremely limited capacity to generate and raise revenue and finance their operations. More than 80% of their funds comes from the central government and EU subsidies (see Appendix A.2).

chosen specification is equivalent to a standard "Differences-in-Differences" model with treatment leads. The coefficient of interest is β_1 which captures the differential impact of the shock (expected cuts) on the regions with larger share of public sector employment. It is expected to be positive since our model predicted that in regions where spending-cuts and public sector job-cuts are expected to be larger (in this case due to an exogenously imposed constraint) electoral fragmentation will increase by more due to less transfers.

Furthermore, in order to insulate our estimation we take three important steps: Firstly, only for the post-shock electoral results but *not* for the pre-shock ones, we group the "rebel candidates" vote shares[74] (expressing disagreement with their mother parties and in this particular case with the IMF memorandum) with the vote shares of the "officially" endorsed candidates of their respective mother-parties[75]. Secondly, we estimate our model using the NUTS-3 regions as our main unit of analysis. Going from the NUTS-2 to the NUTS-3 level we ensure that the metropolitan regions of Athens and Thessaloniki, the two regions that exhibit the highest volatility in fragmentation and where the most sharp increase in fragmentation was recorded in 2010, are significantly under-represented in the sample. Rather than being two out of 12 regions (almost 17% of the sample) they are now recorded as two out of a total of 48 regions (only 4% of the sample).

Moreover, in some specifications we completely exclude those regions to account for the "education" effect. That is, since the level of college graduates is higher in those regions and given that literature suggests that more educated voters are more

[74] All political parties that are represented in the Parliament officially endorse candidates for each regional electoral competition both at the NUTS-2 and -3 levels. Moreover, in most of the cases those candidates are high-profile party members. Party members who disagree with those choices or want to express a general disagreement against the pursued policies of party leadership may contest this choice by entering the race as "rebel" candidates.

[75] Greek Local elections, as evidence in Figures B.11, B.12 and B.13 show, have a flavour of national mid-term elections.

likely to acquire and process faster politically relevant information with regards to the economic situation it might be the case that the difference in fragmentation we pick up is driven by this effect. Yet, by excluding those regions from the estimation we can account for this without our results changing dramatically. Finally, we use pre-shock lags (the terms $\sum_{\tau} \delta_{\tau}(HighPS)_s * \lambda_{\tau}$ in the estimated equation) in order to analyze the trend of fragmentation across the two groups of regions over time. The general idea of all these steps is to *artificially* suppress downwards the post-shock levels of electoral fragmentation for the quasi-treatment regions (in crude numbers the difference is cut down in half). If we still manage to get a statistically significant and large in magnitude positive coefficient on the interaction term then, this would imply that the effect we are capturing is large in magnitude.

Before presenting our main results, and in order to address some concerns that might arise due to the fact that we are using observations both from national and local elections, we need to make a short comment on the nature of electoral competition in Greece both at a local and national level[76]. Here, we briefly refer to Figures B.12 and B.13, where we compare the trend of electoral fragmentation between national and local elections both within and across groups of regions. As we can see, there seems to be *no significant difference* in the trend either within or across groups. Since the common (in our case almost identical) trends assumptions is satisfied, we can proceed with our estimation. Nevertheless, in all estimated specifications we use a *local elections dummy* to control for any unobserved differential effect.

2.3.3 Estimation Results: NUTS-3 Level

In Tables B.10 and B.11, we present the results of our main estimates under alternative specifications. In all of them our key estimate, the coefficient on the inter-

[76] For a more detailed review see Appendix A.2

action dummy between high public sector regions and the post-shock time variable is positive, large in magnitude (from 2.4 to 3.0) and statistically significant at any conventional level. Especially in Columns (2) and (4), when we include the leads, the coefficient gains in significance. The positive value of β_1 confirms our hypothesis that the expectation of reduced redistributive transfers and public spending (and less rents) has led to a larger increase in electoral fragmentation in regions with larger public sector share. The increase in fragmentation is more than double in those regions. Hence, we conclude that the effect is also economically significant.

Those results can be interpreted as follows: the expected cuts in redistributive transfers and public spending that generated expectations for lower rents and government jobs caused a differential response among regions where the expectation is that they are going to be more adversely impacted by these cuts. As a result, the initial positive impact of more constraints on fragmentation is exacerbated. This finding comes as further support to the hypothesized *positive* relationship between institutional constraints on economic policy (this time imposed by the Troika) and electoral fragmentation. Collecting together all the evidence, we conclude that the expected reduction in redistributive transfers and public spending had an undisputed negative (positive) effect on the concentration of electoral power (fragmentation) shaking the foundations of the Greek bipartisan system.

2.3.4 Discussion of the Results

Our case study on greek local elections provided empirical support for the importance of constraints in conducting economic policy. More specifically, through a natural experiment that exploits an information shock, we showed a causal relationship between decreasing expected redistributive transfers and increasing party-system fragmentation. We have also highlighted the importance of constraints (fiscal or institutional)

in reshaping the political landscape and the structure of the party-system. In fact, we have argued that fiscal discipline, austerity measures and the reforms in public sector, which were adapted by the greek Parliament in order to tackle the debt crisis and receive EU aid, were an exogenous constraint to the Greek government's freedom in conducting economic policy and engaging in generous redistribution according to electoral (opportunistic) motives. This constraint facilitated and accelerated the weakening of the bipartisan basis of the Greek party-system.

Although we do not go as far as claiming that the generalized public spending cuts signaled the end of bipartisanship in the greek political system, we can say with certainty that they have weakened the dominant position that the two major parties enjoyed, undermining the bipartisan foundations of the party-system which were laid on the patron-client relation between voters and politicians. As a result, the policy constraints imposed by the austerity measures increased the level of electoral fragmentation and political pluralism. Yet, this increase in the vote shares of smaller parties came at the cost of both an increased level of polarization and extremism in public affairs and also drastically reduced political participation and voter turn-out, as our next Chapter discusses. On the other hand, it might lead into more inclusive and pluralistic political institutions in the long-run. Overall, it is too early to conclude whether the benefits of increased political pluralism and representation and weaker clientelism will overrun the potential costs of reduced stability and moderation that the bipartisan system was offering. Nevertheless, no matter which side the argument goes, one key point remains: the impact of economic institutions, such as redistributive mechanisms, and of institutional constraints on the structure of the party-system are of outmost importance.

2.4 Concluding remarks

In this paper, we have given a comprehensive account on the relationship between economic conditions and the structure of the party-system by exploring the impact that unemployment and redistribution have on the distribution of electoral power among parties (electoral fragmentation). Departing from previous literature, which argues that party-system fragmentation depends mainly on the existing institutional arrangements, we have presented a theoretical framework of electoral competition that relates fragmentation and party-system structure to changes in economic conditions. In particular, the main contribution of this paper is the theoretical formulation and the empirical verification of this non-monotonic relationship between unemployment and fragmentation that we uncover and which was so far ignored by other voting theories. We have also suggested a link that connects unemployment and party-system structure: *redistributive politics* and *economic voting*. In that respect, our findings echo Tullock's assertion that, since consumers and voters are practically the same individuals, they should apply the same criteria (economic rationality and expected utility maximization) when it also comes to their political choices. Hence, our study supports prospective over retrospective and protest voting theories.

Another important finding of our model is that it highlights the relatively stronger rent-seeking elements in the voting behavior of the unemployed and the incentives of dominant to exploit this behavior and capitalize electorally on it by proposing more redistribution. Additionally, the model also offers an interesting insight, based on rational choice theory, as to why extremist parties target the more ideologically driven voters and lobby for more institutional checks and balances that subject the power of dominant parties to exogenous constraints, while the moderate ones might focus more on tangible political promises and inclusive economic institutions, such as increased

redistribution. In that respect, our empirical study is among the first to document systematically the economic origins of party-system structure and the relationship between unemployment and the distribution of electoral power-sharing among parties. Moreover, our study brings into surface an innate tension between institutional checks and balances (inclusive political institutions) and redistribution mechanisms (inclusive economic institutions). Taken altogether, our findings highlight the importance of economic conditions as determinants of party-system structure and electoral behavior.

Overall, our work paves the way, theoretically and empirically, for a more systematic study of the bidirectional relationship between economic outcomes, institutions and political competition. By endogenizing parties' preferences over economic outcomes, such as unemployment, public spending and redistribution, our model allows the study of the link between economic and political outcomes in both directions. And even though this paper does not explicitly provide a theoretical model of political cycles, it clearly hints the intuition behind such a model since some parties, driven by opportunistic (electoral) motives, might favor policies that prioritize redistribution at the expense of fiscal discipline. As a result, we present a *special interest politics* justification for redistribution which in turn, points to an important reason for caution: inclusive economic institutions (e.g. welfare state) might end up, in the absence of institutional checks and balances, promoting the interests of dominant parties by helping them to consolidate their power, instead of increasing political power-sharing. Hence, this study highlights the limitations of institutional arrangements in guaranteeing prosperity.

Chapter 3

Economic Adversity, Trust and Turnout: A Natural Experiment

The structure of the party-system and the nature of electoral competition aside, there are other equally important parameters that determine the degree of democratic legitimacy and performance of a polity and affect the quality of political institutions and governments alike. Such parameters are the degree of civic engagement in formal political processes and the level of voter participation in elections. Yet, what drives voters to participate is still an open question, both theoretically and empirically. Is voting simply a habitual behavior (Aldrich & Montgomery, 2011), or do economic conditions play a significant role (Rosenstone, 1982) in determining whether citizens will show up in the voting booths? Moreover, if economic conditions do play an important role in determining voter turnout, what is the link through which they operate? Is it via trust (Hansen & Rosenstone, 1993) or via the "strong party-group linkages" (Powell 1986, p.21-22) and the opportunistic behavior of voters and political parties as Chapter 2 will illustrate? As a result, exploring the impact that economic conditions have on voter turnout and the links through which they operate, can have

important implications in understanding what drives electoral participation and civic engagement in a democracy. Moreover, it can have some implications in the design of policies aiming at increasing the level of voter participation in electoral processes. Especially in advanced western democracies, in Europe and North America, which exhibit a declining trend in voter turnout, the exploration of those links can shed some light in understanding the phenomenon of declining civic engagement in electoral politics.

Therefore, Chapter 3 will examine the impact of economic adversity on voter turnout through two channels: a rationalistic one (party-group linkages) as in Powell (1982 & 1986)[1], and an indirect (normative) one through the impact that economic adversity can have on trust, both towards political institutions and governments (Citrin, 1974; Hansen & Rosenstone, 1993; Hetherington, 1999). Powell's (1982) main conclusion was that "American turnout is inhibited by its institutional context, and the main emphasis is on party-group linkages." On the other hand, Jackman (1987) inspired by Powell's approach, placed even stronger emphasis on the institutional determinants of turnout. Yet, he arrived at completely opposite conclusions. Most importantly, as Blais notes (2006), he left out Powell's key explanatory factor, party-group linkages, simply because it was found to have no systematic effect on turnout. As a result, the relative importance of party-voter linkages, as determinants of turnout, is a controversial issue.

Chapter 3, in line with Powell's findings, stresses the importance of these linkages and attempts to evaluate their relative strength in explaining higher voter turnout. In order to make the point more clear, we utilize the recent economic crisis in Greece, as a case study of a country which historically had very strong linkages. Voter

[1]Powell found that turnout tends to be higher in countries with "strong party-group linkages" due to the fact that vote choice is simpler when and where groups (e.g. labor unions, civil servants, professional associations, churches etc.) are clearly associated with specific parties.

turnout in Greek elections (national and local) has always been very high, exhibiting little variation, until recently (2010) when the public debt crisis struck the economy. This generated a large economic shock which also affected the level of trust in the party-system (see Fig. C.1.a). Subsequently, voter turnout also collapsed. The third chapter will attempt to disentangle two links that connect economic adversity and turnout: trust and party-group linkages. It will also try to identify the causal effect of each one of them on voter turnout. Finally, it will assess their relative strength.

3.0.1 Literature Review

Economic Adversity and Turnout

The impact of economic adversity on turnout and electoral participation has received extensive coverage in the literature, especially in political science. Yet, different scholars have arrived at very divergent findings. Hence, the exact impact of economic hardship on turnout and the links through which it operates (if any) still remain an open question. Rosenstone (1980; 1982) and Wolfinger (1980) provide a detailed account of theories and competing claims that attempt to associate economic conditions with voter turnout. The first stream of those, pioneered by Schlozman and Verba (1979) and known as the *mobilization effect*, argues that "... economic adversity increases voter turnout since people under economic strain are more likely to blame the government for their situation and thus vote, organize, lobby and protest to redress their grievances." Lipset (1960) also stresses that: "Groups subject to economic pressures with which individuals cannot cope [...] might also be expected to turn to government action as a solution and show a high voting average." An alternative link that leads to the same conclusions is provided via the theory of *negative voting*. Kernell (1977), presents evidence that the motivation to punish is greater

than the motivation to reward the government. Hence, it is reasonable to expect that those who experience economic hardship, the "punishers," would be more likely to vote than other citizens (Kernell 1977).

On the other hand, theories of *withdrawal*, the second stream, make the opposite claim. That is, economic adversity decreases voter participation. The reason is that economic adversity is stressful. As Wolfinger and Rosenstone (1980) note "... [economic adversity] causes preoccupation with personal economic well-being leaving aside broader considerations about external matters such as politics. Hence, economic duress both increases the opportunity cost of political participation and also reduces ones capacity to attend politics." Since the poor are financially constrained, they prefer to spent their scarce resources on figuring out how to make ends meet, instead of worrying about remote considerations such as politics (Kosa 1969; Fried 1969; Brody and Sniderman 1977; Wilcock and Franke 1963; Stein 1964; Maurer 1980; Rosenstone 1982). As a result, Wolfinger and Rosenstone (1980) conclude that the poor are less likely to vote. Yet, both strands of literature focus on individual, not aggregate, economic adversity. That is, they interpret economic adversity as personal economic duress and strain that impacts on political participation through individual behavior that demands remedial government action.

A third strand in the literature contests both claims made above and stresses that the link between personal well-being and political participation might be weak, or even nonexistent (Kinder and Kiewiet, 1979; 1981). An assumption of the mobilization argument was that citizens who experience economic hardship tend to hold the government accountable for their problems and believe that changes in government policies might improve their personal economic situation. But, this link seems to be under question. One reason why personal economic conditions are unrelated to political preferences and electoral behavior might be that most people do not seek a

political solution to their personal economic problems (Fiorina 1978). Rather, they hold themselves accountable (Sniderman and Brody, 1977; Schlozman and Verba, 1979) since "economic discontents and political judgements might inhabit separate mental domains" (Kinder and Kiewiet, 1979). An alternative explanation might be that unemployment, poverty and other economic problems do not produce much personal strain (Garraty, 1978), especially if the incidence of unemployment is temporary and income support services are in operation. In short, people with economic problems do not experience personal duress or not draw a connection between their personal economic condition and politics and as a result, they are *not* more likely to vote. Several empirical studies confirm the "no effect" claim (Arcelus and Meltzer, 1975; Fiorina, 1978; Kinder and Kiewiet, 1981). Fiorina (1978, p. 439) concludes that "there is no discernible relationship between economic conditions and voting turnout."

Our third chapter, departs from previous literature in the following sense. As far as the definition of economic adversity is concerned, the literature focused solely on economic hardship that struck the individual voter. That is, the strain placed on citizens' well-being due to personal economic adversity that demanded either more government action (mobilization effect) or reduced their capacity to participate in politics due to higher opportunity cost (withdrawal effect). In Chapter 3, we focus on another form of economic adversity: aggregate economic adversity which takes the form of the state's inability to provide public spending, social payments and rents to specific groups of voters or the society at large. It is this latter form of economic adversity that we examine hereinafter. The most efficient way of doing it is to study the case of Greece that was hit by severe economic adversity in the last couple of years.

Literature Review: Trust and Turnout

When it comes to the impact of trust on political participation and turnout the literature seems to have reached to much more conclusive, yet negative, results. Hetherington (1999) in an article that summarizes recent literature affirms that: "Scholars exploring the link between declining political trust and declining political participation have consistently arrived at null findings." Citrin (1974) finds that those who trust the government are "[N]o more likely to vote, engage in campaigning activities or any other form of formal political participation than those who do not." His finds no evidence in support of the claim that "political cynics are more likely to withdraw from participation in conventional electoral politics than people who do trust the government." He also offers a potential explanation as to why trust for the government might not be a key determinant of turnout by reversing the line of causality. In his words: "[...] behaviors may cause attitudes rather than the reverse." That is, trust to government might be endogenous to participation. Citizens who choose not to participate in formal political activities (e.g. voting) may, in time, develop a higher level of apathy and cynicism for the party-system and governments which can then be translated into lower levels of trust. Similarly, Rosenstone and Hansen (1993) find that: "[C]ontrolling for a set of other parameters, trust has no significant effect on any form of electoral participation. Only one study (Miller et al., 1979) finds that "[...] trust might have a small indirect effect on electoral participation through the link of external efficacy, that is, the perception that citizens have on the governments responsiveness to their demands." In that sense, this argument is more closely related to this chapter, although we focus on an alternative measure of trust: trust towards the party-system, not just government. Overall, there seems to be a wide consensus on the statement that empirical research

has so far consistently demonstrated that *no direct link* exists between trust and turnout (Hetherington, 1999).

3.1 Evidence on Turnout from Greek Elections

In the introduction we identified two potential links through which economic adversity can affect electoral participation and voter turnout. One link is via trust (or lack of it) that can have a positive (negative) effect on voter turnout. The second one is via the linkages between parties and voters and the latter's expectations for rent-seeking. That is, conditional on higher expected public spending and public sector job-creation, especially in regions where public sector is large and the chances of finding government employment are higher, voters' inclination towards political participation is driven by their desire to increase the probability of being among the beneficiaries (rent-seeking). Data reveal that there was a sharp, more than ten percentage-point, decline in voter turnout at the 2010 elections, which also coincided with a large decline in trust (Fig. C.1.a). Moreover, it appears that this decline was larger in regions where the size of public sector over total employment is larger (Fig. C.2). Hence, stylized evidence suggest that economic adversity, in the form of the debt shock, has had a differential impact on these regions. In this context, the recent economic crisis that struck Greece and forced the state to engage in extensive public spending and public sector job cuts, can be used to examine the impact of those cuts on voter turnout, both directly and indirectly (via declining political trust). The latter being an outcome of fiscal irresponsibility by the two major parties[2] which were found guilty, by the European Commission, of forging Greece's fiscal data.

[2]Historically, since the restoration of the Republic in 1974 there were only two parties that participated in government: the centre-left Panhellenic Socialist Movement [PASOK] and the centre-right New Democracy [Nea Dimokratia].

Furthermore, the revelation of the actual data on Greek public finances for the 2006-08 period occurred in mid-2010. A look at Figure A.1 makes this point more clear[3]. As we stressed in Chapter 2, Section 3, the first revision that took place in the period from May-September 2009, related to the FY2009 deficit. But, the second revision (May-September 2010) was mainly due to *concealed* information on the deficit of the Greek central government for FY2006-07 that authorities kept secret from voters and markets. Hence, the second revision is not an outcome of current political actions. The deficits were old. What was indeed new is the revelation of this piece of information to the public that occurred just days before the November 2010 elections. That is why, we refer to this second revision as a pure *information shock* on past economic performance which did not alter the current economic fundamentals.[4] Hence, we can exploit the action of the Greek Government to fiddle the books to identify the causal link that runs from expected spending cuts (economic adversity) to electoral participation and voter turnout.

Focusing on the Greek debt crisis and using data from Greek local and national elections is a promising empirical strategy for a set of reasons. Firstly, the Greek case study allows us to explore the two links though which economic adversity can have an impact on voter turnout: the decline in trust and the expected sharp cut in government spending and in public sector job creation. Secondly, the Greek political system is characterized by long-lasting clientelism and strong party-group linkages, especially for the dominant ones. The origins of the clientelistic nature of the Greek political system date back to the beginning of the 20^{th} century[5]. Hence, Greece offers

[3] A more detailed description of the timing of events and the generated information shock is included in Appendix A.1.

[4] In fact, the economy was in recession from the second quarter of 2008 and Greece was recording deficits since 2006. Yet, this was only revealed in May 2010, when the international audit by the Troika (IMF, EU, ECB) took place.

[5] A more detailed description of the structure of the Greek party-system can be found in the Appendix A.2, together with some discussion on regional governance in Greece.

an ideal case study for examining the impact of rent-seeking on political participation. Thirdly, and more importantly, the two step audit and revision of Greek public finances that was published in October of 2009 and 2010 respectively, offers the opportunity to exploit the *information shock* as a *natural experiment* in order to identify the causal link running from economic adversity to electoral participation. The reason is that this second revision altered voters' *expectations* on the state's ability to engage in public sector expansion and extensive public spending in the *future*.

3.1.1 Working Hypotheses

The goal of this chapter is to identify the causal relationship that runs from economic adversity to voter turnout and political participation. Furthermore, it will try to assess the relative strength of two different links through which this effect operates: political trust and expected public spending (rents). In order to investigate those relationships we will formulate three hypotheses which will then test using data from Greek elections since 1996.

Hypothesis 1 *Only the level of trust that citizens have for the party-system and political parties matters for political participation and voter turnout. Trust towards the government is cyclical and plays no role.*

In line with stylized evidence, we hypothesize that economic adversity, caused by fiscal derailment and the subsequent falsification of the data by the Greek government, reduced the level of trust that citizens have both for the government and the party-system as a whole. It is the reduced trust for the latter that caused the sharp decline in voter turnout, observed in 2010 elections. It is crucial to mention that our first hypothesis makes a clear distinction between trust in government and trust in the party-system. As a result, our hypothesis has two components: On the

one hand, we hypothesize that the decline in trust for government is not a significant determinant of voter turnout. The reason is that trust for government follows the political cycle: voters tend to trust more newly-elected governments whereas trust to government sharply declines before a government is being voted-out in elections. In fact, it might be the case that voter turnout can increase when trust in government is low for reasons related to the voters' desire to vote them out of office. Hence, one should expect that trust in government should not have a systematic effect on turnout. The second part of our hypothesis states that only changes in core trust, defined as trust in the political parties and the party-system, can lead to changes in voter turnout. In this respect, our first hypothesis, in part, runs against mainstream consensus reached so far that there is no systematic link between trust and turnout. Our contribution is that we disentangle these two aspects of political trust and we show that only trust in the party-system matters.

Hypothesis 2 *A decrease in expected public spending and in public sector job creation rate is associated with a decrease in voter turnout. Moreover, regions with higher share of public sector employment are more adversely affected by the cuts.*

Our second hypothesis explores the direct link between anticipated economic adversity and voter turnout. By economic adversity we mean the expected cuts in public spending and public sector job creation that voters rationally anticipate as a result of the fiscal derailment started in 2005 but only revealed in 2010, culminating into a debt crisis that resulted in massive austerity (actual and expected) under the auspices of the Troika (IMF, EU, ECB). As a result, we hypothesize that the expectation of less public spending and public sector job creation decreased the incentives of opportunist rent-seeking voters to participate in elections and express their support for the parties. We also hypothesize that regions with larger share of public sector employment before the onset of the crisis were disproportionately

affected by the fiscal cuts since slashing the size of the public sector had a larger negative impact on those areas. Hence, we claim that the size of public sector acted like a catalyst that exacerbated the effect of economic adversity on turnout.

Hypothesis 3 *The differential (more negative) impact of public spending cuts on voter turnout in regions with large public sector size is due to the prevalence and stronger resilience of clientelistic links there.*

Finally, our last hypothesis explores the causal link of the differential impact that expected public spending cuts had on regions with higher public sector employment where the decline in turnout was larger. Since our other explanatory link (trust) appears to move in parallel across regions (see Fig. C.3), we will examine a series of alternative explanations (e.g. education/income, urbanization and clientelism) and we will argue that the differential decline in turnout was caused by stronger and more salient party-group linkages in those regions. Testing this hypothesis is by far more challenging due to the nature of those linkages. For their most part they are very difficult to observe and even harder to quantify and measure. As a result, to test our third hypothesis we will follow a process of successive elimination of three alternative explanatory stories before we present evidence in favour of our third Hypothesis.

3.2 Data and Identification

Before testing our hypotheses, we will first describe our data sources. Initially, we present our identification strategy in greater detail. Then, we will present our key findings and estimation results. First, let us start with the data.

3.2.1 Data Description

Our data set is a compilation of data coming from various sources and own computations. Voter turnout, our key variable of interest, and other electoral data were retrieved from the Greek Ministry of Interior. Data on voter turnout were reported at the NUTS-3 level and aggregation to the periphery level (NUTS-2) was done by own calculations. We have also supplemented our data on voter turn-out with a series of economic and socio-demographic variables at the NUTS-3 level for reasons of consistency with our main unit of analysis. Data on labour force composition, economic and socio-demographic characteristics at the regional level were retrieved from the EU Labor Force Survey (LFS) and the 2010 Eurostat Regional Yearbook. Data on educational attainment and regional unemployment rates were retrieved from the Greek statistical agency HELSTAT. Our sample spans from 1996 until 2010, but data on regional unemployment at the NUTS-2 and -3 levels are reported only from 1999 and onwards.

The most challenging aspect in the compilation of our data set was the collection of data measuring trust in government, the party-system and the parliamentary parties. To accomplish this task, we relied on data collected via the Eurobarometer surveys from 1996 and onwards. The challenge was the disaggregation of the data at the NUTS-2 level. Due to small sample size for the Greek section of the Eurobarometer (approximately 1,000 individuals were surveyed periodically) and the large number of peripheries at the NUTS-2 level (12) disaggregation was not always possible. The resulting sample base at the NUTS-2 level would have been too small to conduct any meaningful statistical analysis. As a rule of thumb, we decided to merge with a neighboring one any region with a sample base of less than 50 respondents[6]. As a result, some recalculations were necessary. Finally, the Eurobarometer

[6]Because of this, we have excluded two regions from our analysis (Aegean islands and Ionian

survey changed the major sub-sample units for which it reported disaggregated data in 2006. For reasons of consistency, we recalculated those values using past methodology as a reference point. Needless to say that reporting data on trust for the NUTS-3 level (prefecture) would have been pointless due to insufficient sample size[7]. Consequently, in order to test our first hypothesis we will have to confine ourselves to the NUTS-2 sample with a total of 90 observations. Introducing economic controls further reduces our sample size to 70 observations (we lose two electoral contests in 1996 and 1998). Despite these limitations posed by sample size, we will continue with our econometric estimation.

3.2.2 Identification Strategy

In order to test our first hypothesis we will restrict our attention to the NUTS-2 sample since it is the only one that contains meaningful data for trust. As we have argued, the information shock will allow us to capture the causal effect that runs from expected economic adversity -and the subsequent decline in trust and expected public spending- to voter turnout. To test our second hypothesis and identify the differential impact of expected cuts in public spending and public sector job creation, we will split our sample into two groups of regions: those with high share of public sector employment (and higher growth rate of public sector job creation from 2000-2008) and those with lower one. Table C.1 contains some basic summary statistics.

Our key identifying assumption is the following. Although the economic crisis affected all regions, the information shock had a differential impact on those regions that used to rely more on public sector jobs. The rationale is that the revelation of new information generated expectations for drastic cuts in the size of the public sector

islands) and we merged Western with Central Macedonia.

[7]With the exception of Athens and Thessalonica no other region would have had the necessary sample base in order to conduct any meaningful statistical analysis.

in those regions, resulting inevitably in larger spending cuts since the states's ability to generate jobs and transfer resources to voters and local authorities[8] is severely undermined for many years to come. Therefore, voters on those regions expect to be disproportionately affected by these spending cuts. As a result, we should expect that the negative effect of economic adversity on turnout will be exacerbated there. In fact, as data reveal (Fig. C.2), voter turnout decreased more sharply (by three percentage points more) in regions where the size of the public sector is larger. In order to identify this relationship econometrically, we estimate a "Differences-in-Differences" model. Formally, we specify the following OLS model:

$$Turnout_{s,t} =$$
$$\alpha_0+\gamma_s+\lambda_t+\boldsymbol{\beta}_1(Trust)_{s,t}+\boldsymbol{\beta}_2(HighPS)_s*\lambda_{2010}+\sum_{\tau=1996}^{2009}\delta_\tau(HighPS)_s*\lambda_\tau+\mathbf{X}_{s,t}+\varepsilon_{s,t}$$

where γ_s are region (NUTS-2) dummies, λ_t are electoral year dummies (i.e. λ_{2010} is the post info-shock dummy) and *High Public Sector*$*\lambda_{2010}$ is the interaction dummy. Turnout and trust are measured in percentage terms. Finally, $X_{s,t}$ is the set of other controls (e.g. unemployment, local elections dummy, socio-demographic controls etc.). In some specifications we interact the control variables with the *High Public Sector* dummy in order to control for the possibility that some variables might have a differential impact on high public sector regions.

Clearly, the key coefficients of interest are β_1 and β_2. The first one (expected to be positive) will test Hypothesis 1 (the relationship between trust and turnout). The second one (expected to be negative) will test Hypothesis 2 which captures the larger negative impact of expected fiscal adjustment and public sector job-cuts (identified

[8]Most of the funding towards Greek local administrations (80%) comes from direct central government subsidies and EU structural funds. Local authorities in Greece have very limited capacity in generating and raising revenues to finance their operations.

through the information shock) on regions with higher share of public sector employment. Since we introduce regional dummies (at the NUTS-2 level), electoral year dummies and the interaction terms $\sum_{\tau} \delta_{\tau}(HighPS)_s * \lambda_{\tau}$, our chosen specification is equivalent to a standard "Differences-in-Differences" model with treatment leads.

3.2.3 Estimation Results: NUTS-2 Level

In Tables C.3 and C.4 we present our main results at the NUTS-2 level. In all specifications the coefficient on *Year 2010* (the post-shock dummy) is highly negative (from -5.1 to -9.6 percentage points) and statistically significant capturing the negative impact of expected spending cuts and economic adversity on turnout. Furthermore, looking at Columns 1 and 2 (Table C.3), one can see that trust in government plays no role in determining voter turnout,.since the coefficient is not statistically significant at any conventional level. Contrary to that, the coefficient on trust in the party-system is positive (ranging from 0.12 to 0.2) and statistically significant in all subsequent specifications and especially in Columns 3 and 4 (Table C.3) when the full model is estimated. This, yields support to our first hypothesis that only trust in the party-system is positively associated with voter turnout.

In Columns 2 to 4 (Table C.4), we present the estimates of our main specification with the inclusion of economic controls (unemployment and income) which we also interact with the *High Public Sector* dummy. As hypothesized, the coefficient on the interaction term (β_2) is always negative (-6.4 percentage points) and statistically significant under all alternative specifications, confirming our second hypothesis. Furthermore, the inclusion of treatment leads (interaction terms $\sum_{\tau} \delta_{\tau}(HighPS)_s * \lambda_{\tau}$) reveals that none of them is statistically significant at any conventional level. This confirms the pre-shock parallel trends assumption for turnout among the two groups of regions, something which was anticipated, as we can see from Figure C.2. Further-

more, the decline in trust (caused by the falsification of fiscal data by both major parties) did not follow a differential pattern among high and low public sector regions, as evidence suggest (Fig. C.3). Hence, the larger decline of turnout in regions with high public sector as a response to the information shock cannot be attributed to differential changes in trust. Having eliminated the first of the two possible links through which economic adversity can have an impact on turnout, we conclude that the differential decline of turnout in high public sector regions can be attributed to the differential impact of expected cuts on those regions. Whether this is caused by the weakening of linkages, or not, remains to be tested (Hypothesis 3). In sum, evidence at the NUTS-2 level yield support for our first two hypotheses. Yet, some further analysis is warranted.

3.3 Identification revisited: Going NUTS-3

As stressed before, some caution needs to be taken in interpreting the results in Tables C.3 and C.4 when testing our second and third hypotheses. This is so, because high public sector employment might be a proxy for other characteristics, observed and unobserved that are different across the two groups and might be responsible for the differential impact of expected spending cuts on turnout across the two groups. In the case of observable characteristics (e.g. income per capita, unemployment, education levels, degree of urbanization etc.), one can control for them, as we already did, by interacting them with the high public sector dummy. Yet, a problem arises with those unobservable characteristics that may vary differentially across the two groups over time and hence, they are not picked-up by the inclusion of fixed effects. As a result, we need to introduce an instrumental variable in order to identify the causal link between the size of public sector and voter turnout.

Moreover, introducing an instrumental variable in the regression would prove to be very useful in testing our third and final hypothesis stating that the link through which this effect operates is the presence of more resilient clientelistic linkages in regions with higher public sector employment. The reason is that there might be a reverse causality problem: regions with high public sector employment, and stronger linkages, might be the outcome of higher turnout and political participation. That is, parties might target electorally and generate more public sector jobs in those regions that historically had higher levels of political participation as they see more potential voters and better chances of electoral success there. In order to account both for the presence of time-variant unobservable characteristics and also for the reverse causality issue we introduce an instrument that relates to the institutional set-up during the days of the Ottoman Empire, on the eve of the creation of the modern Greek State (early 19^{th} century). That is, we will use the existence of an Ottoman military district HQ (known as *sanjak*) within the administrative boundaries of a current NUTS-3 region in Greece (prefecture) in order to instrument for regions having larger public sector size. On a technical note, we will have to extend our analysis to the NUTS-3 level in order to generate enough variation across regions for our instrument to operate.

3.3.1 Identifying High Public Sector Regions with an Instrumental Variable

Before presenting our main econometric specification, it is necessary to say a few words on the historical context and the institutional background that dictated the choice of our instrumental variable and summarize the key points of our argument behind its use. A more detailed historical account and details on the construction

of our instrumental variable can be found in Appendix A.3. Briefly, our argument develops as follows: Ottoman military HQ's (*sanjak*) within the region that constitutes modern-day Greece, were chosen by Ottoman nobility (*Sanjak Beyi*) in the 16^{th} century for geographical and strategic reasons in order to serve the Empire's military needs and maximize efficient allocation of military resources (Inalcik, 1954). Yet, with the arrival of industrial revolution the military innovations and the creation of new financial institutions in North Europe gave a military advantage to England (Kennedy, 1989; Harrison, 2011) and increased the pressure on the Ottoman Empire. By the late 18^{th} century the Empire was gradually losing some of its territories. In the eve of the 19^{th} century the need for military modernization and re-organization became more obvious than ever before (Inalcık et al., 1994). This need for reforms initiated the *Tanzimât* (Period of Reforms) that lasted from 1826-1878. As a result, French and German experts, known as the *"Men of the Tanzimât"*, were called upon to assume the task of bringing the Ottoman fighting machine in level with other western European militaries. Yet, those experts brought with them the bureaucratic traditions of their states, instituting a vast amount of administrative services and logistical support units ranging from military academies to hospitals etc. As a result, in localities chosen by the Ottomans as military HQ's of their feudal districts (*sanjak*) bureaucracy developed at a much faster speed and the number of civil servants doubled. At the end of the *Tanzimât* period the sheer size and scope of Ottoman administration has grown enormously (Quataert, Pamuk et al., 1994).

At the same time, during the 19^{th} century, the Greek state gained its independence from the Ottomans (1831), and the gradual annexation of ex-Ottoman regions to the newly-born state commenced (1881-1914). Given the very primitive resources and administrative capabilities of the Greek state, the creation of a viable military machine and of an effective bureaucracy, once more, fell upon foreign advisors

(Petropulos, 1968). In fact, the effort to organize the Greek state as a modern western state percolated from the top to bottom (Kostis, 2005; Muzelis, 1991) much like in the case of Ottoman administrative reforms (Quataert et al., 1994). Moreover, there was a large degree of institutional continuity between the new Greek state and the Ottoman empire (Kostis, 2005; Petropulos, 1968). Hence, foreign consultants built upon the existing infrastructure of the *Tanzimât* era that was introduced during the reforms (1826-1878), which coincided, for their most part, with the expansion of the Greek state at the Ottoman's expense (1831-1913). The result of this process was for the Greek state to rely extensively on the administrative and institutional infrastructure built during the Ottoman era, sometimes changing only the names of the "old" institutions and administrative centers into Greek, but maintaining their previous functions, structure and composition (Kostis, 2005).

The link between Ottoman Institutions and Greek Administration

Our key identifying assumption is that, given this institutional inertia, regions with Ottoman administrative centers (*sanjak HQ*) within their boundaries in the 17^{th} century, simply because of institutional inertia and pre-existing infrastructure, where more likely to be chosen as hubs and administrative centers in the young Greek state. Therefore, we should expect that the presence of an Ottoman administrative HQ within the boundaries of a NUTS-3 region would increase the chances of this region chosen as administrative center. Since public sector employment was historically larger in the administrative centers in Greece, we are thus able to exploit this 17^{th} century randomization on the localities chosen as Ottoman military HQ and use the existence of a such a center (*sanjak*) within a NUTS-3 region to instrument for treatment regions with *higher public sector* employment share. A quick look on Table C.2 shows that our instrument is as good as randomly assigned, since the two

groups of regions seem to *differ only* in the level and the growth rate of the public sector. Moreover, looking at the reduced form graph that captures the intensity to treatment effect (Fig. C.4), we can clearly see that the parallel trends assumption is being satisfied. In addition, we present (Table C.5) the reduced form (intensity to treatment) OLS estimates which confirm our identifying hypothesis. Our estimates suggest that there was a larger decline in voter turnout in the treatment regions (-3.3 percentage points when we include treatment leads and controls, -2.0 otherwise). Moreover, the coefficient on the interaction term *Sanjak*Year2010* that measures the differential decline in turnout is statistically significant at the 1% level.

3.3.2 Econometric Specification

We have already discussed the information shock affecting differentially the regions that have a larger share of public sector by shifting voters' expectations on the severity of public spending cuts. As a result, we should be able to identify the differential impact of expected cuts on voter turn-out on those regions by interacting our post-shock year dummy (*Year 2010*) with our instrumental variable (*sanjak*). Clearly, as evidence in Figure C.4 suggest, the fall in voter turn-out was larger in regions where there used to be a *sanjak* (instrumenting for regions with higher public sector employment). In fact, voter turn-out in the treatment regions converged to that of the control ones. To verify this claim, one would want to estimate the following 2SLS model:

$$(HighPS)_s * \lambda_{2010} =$$
$$\alpha_0 + \gamma_s + \lambda_t + \boldsymbol{\beta}_1 (SanjakHQ)_s * \lambda_{2010} + \sum_{\tau=1996}^{2009} \rho_\tau (SanjakHQ)_s * \lambda_\tau + \mathbf{X}_{s,t} + \eta_{s,t}$$

and

$$Turnout_{s,t} =$$
$$\alpha_0 + \gamma_s + \lambda_t + \boldsymbol{\delta}_1 \widehat{(HighPS)_s} * \lambda_{2010} + \sum_{\tau=1996}^{2009} \delta_\tau (SanjakHQ)_s * \lambda_\tau + \boldsymbol{X}_{s,t} + \varepsilon_{s,t}$$

where γ_s are regional dummies (at the NUTS-3 level), λ_t are year dummies (i.e. $\lambda_{2010} = 1$, if $t = 2010$, is the post-information shock dummy) and $\widehat{(HighPS)_s} * \lambda_{2010}$ is the predicted value of the interaction dummy that we instrument for in the first stage. Finally, $X_{s,t}$ is the set of other controls (e.g. unemployment, local elections dummy, income, education and other socio-demographic controls). Clearly the coefficient of interest is δ_1, capturing the differential impact of expected public spending cuts on turnout in the high public sector regions. According to our second hypothesis, it should have a negative sign.

In the first stage we run a Linear Probability Model, where we instrument for High Public Sector Regions with the dummy variable taking the value of 1 if an Ottoman military center was stationed within the boundaries of the respective NUTS-3 region. Of those 48 regions, 23 used to have a *sanjak* within their boundaries. We expect $\boldsymbol{\beta}_1 > 0$, according to our identifying hypothesis. Table C.7 presents the estimates of the first-stage regressions and confirms our hypothesis at any conventional level of significance (the first-stage F-statistic score on the excluded IV is above the conventionally accepted critical value of 10).

Robustness Checks

In order to insulate our estimations we take three important steps. Firstly, going from the NUTS-2 to the NUTS-3 level we secure that the metropolitan regions of Athens and Thessalonica, the two regions where the most sharp decrease in voter turnout was recorded in the 2010 elections, are significantly under-represented in the sample. Rather than being two out of 12 regions (almost 17% of the sample) they

are now recorded as two out of a total of 48 regions (only 4% of the sample).

Secondly, in some specifications we completely exclude those regions to account for the "education" effect. That is, since the level of college graduates might be higher in those regions and given that literature suggests that more educated voters are more likely to perceive and process faster new information with regards to the economic situation it might be the case that the difference in voter turn-out we pick up is driven by this effect. Yet, by excluding those regions, we can account for it.[9] Since our results do not change dramatically, we decide to stick with this specification.

Finally, we use treatment leads (the terms $\sum_{\tau} \delta_{\tau}(SanjakHQ)_s * \lambda_{\tau}$ in the estimated equation) in order to analyze the trend of the treatment effect over time. That is, there might have been recorded in the past a wide difference in voter turn-out level among regions with high and low public sector employment. So, we might be picking up this trend rather than the impact of the information shock that generated expectations for lower public spending. Nevertheless, the inclusion of treatment leads accounts for this successfully. The general idea of all these steps is to *artificially* suppress upwards the post-shock levels of voter turn-out, underestimating our effect. If we still manage to get a statistically significant negative coefficient on the interaction term δ_1 then, this would imply that the effect we are capturing is there. As our results indicate in the next section, the difference between the two groups that we pick up can be attributed to the information shock.

We have addressed concerns arising due to the fact that we are using observations both from national and regional elections in the previous Chapter. We do so, in more length, in Appendix A.2[10]. For a quick exposition, Figures C.5 and C.6 compare

[9] We come back to this point in more detail in the section that follows.

[10] Greek Local elections, as evidence in Figures B.11, B.12 and B.13 suggest (Appendix B), have a flavour of national mid-term elections. As a result all main parties that are represented in the

the trend of voter turn-out among national and local elections both within (Fig. C.5) and across (Fig. C.6) the two groups of regions. We can see that there is *no significant difference* in the pre-shock trend of turnout. Since the parallel trends assumptions is satisfied, we can proceed with our estimation. Nevertheless, in all our specifications we use a *local elections dummy* as a control to account for possible unobserved heterogeneity.

3.3.3 Estimation Results: NUTS-3 Level

Tables C.8 and C.9, in the Appendix, contain the estimates of our basic IV model under many alternative specifications. In all of them our parameter of interest, the coefficient on the interaction term between high public sector regions and the post-shock time variable is always negative, large in magnitude (ranging from -3.4 to -5.8 percentage-points) and statistically significant at any conventional level. Column 4 in both tables C.8 and C.9, shows the estimates of our preferred specification with the inclusion of treatment leads. In these estimates, we see that the coefficient of interest almost doubles in magnitude. Its negative value supports our second Hypothesis that the expected public spending and government job cuts (less expected rents) have led to decline in turnout which was larger (by more than 5.5 percentage-points) in the treatment regions. The magnitude of the effect is also quite large. The point estimate on the coefficient can be interpreted as saying that from the 12 percentage-points of the observed decline in turnout in those regions, almost half of it can be attributed to the catalytic role of the public sector. That is, in regions identified as having a large public sector share, the decline in turnout was about 60% larger than the respective figure in the control regions. This difference can be

Parliament officially endorse candidates for each regional electoral competition both at the NUTS-2 and -3 levels. Moreover, in most of the cases those candidates are high-profile party members.

attributed to the size of the public sector. Hence, we conclude that the effect is not only statistically, but also politically significant, implying that the size of the public sector acted as a catalyst that exacerbated the negative effects of economic adversity on turnout (Hypothesis 2). Furthermore, the coefficient on the last treatment lead (*Sanjak*2009*) fails to be statistically significant at the conventional 5% level. This implies that the role of public sector kicks-in only when the expectations-shifting information shock occurred. In sum, our empirical findings yield strong support in favor of our second hypothesis. Yet, the task of identifying the causal link (or links) through which public sector size affects voter turnout is still an open question.

Alternative Hypotheses

Our main hypothesis states that expected cuts in public spending and job-creation caused a differential response in the regions where the size of the public sector is large, due to stronger and more resilient clientelistic links between voters and parties. Before examining its validity, we will first examine some alternative hypotheses that might explain this phenomenon. We examine them one-by-one.

Alternative Hypothesis 1: Trust One potential explanation for significantly larger decline in turnout in regions with larger public sector share could be a differential change in trust. As we have shown before, trust is a significant determinant of turnout. If in the treatment regions (the ones we instrumented for using *sanjak*) trust declined more then, this could potentially explain our finding. Perhaps in those regions voters have placed more hopes on the government and the parties concerning their job prospects and personal welfare through higher public spending, subsidies and job-creation. Hence, the revelation of the truth about the bad condition of public finances has triggered a wave of mistrust against current and the past governments

and the party-system as a whole. To the extent that this effect was stronger in treatment regions, it could have caused a much larger decline in trust, which in turn, can be responsible for the differential decline in turnout. Yet, we find no evidence in the data (Fig. C.7) of a differential decline in trust among the two groups of regions. That is, trust cannot constitute a valid alternative explanation[11].

Alternative Hypothesis 2: Education One of the most consistently documented relationships in the field of political behavior is the close association between educational attainment, especially at the tertiary level, and formal political participation like turnout. A number of studies over the past half century have found that educated citizens are more likely to vote in elections and participate in the campaigns of political parties (see Campbell et al., 1960; Hillygus, 2005; Nie et al., 1996; Schlozman, 2002; Wolfinger and Rosenstone, 1980; Rosenstone and Hansen, 1993). The reason is quite clear, according to scholars education helps citizens to acquire the skills, resources and knowledge that are necessary for them in order to participate in the political discourse and communicate their concerns to politicians (Verba et. al, 1995). Furthermore, as Rosenstone and Hansen (1993, p. 136) argue that "[...] well educated citizens have the skills to understand the abstract subjects of politics, follow the political campaigns and to *search for and evaluate information* about the issues, the platforms and the candidates."

It is this last part that is the most relevant to our study. Since we have argued that the falsification of Greek fiscal data constituted a large-scale information shock on the expectations of voters vis-à-vis future public spending and job cuts, it should be the case that more educated voters would have been both better informed about the matter and also more able to process the information and adjust their expectations

[11] Recall that in the previous section, our results at the NUTS-2 level controlled for trust. There as well, there was no evidence of a differential change between high and low public sector regions.

accordingly. As a result, to the extent which the size of public sector employment in a region can be a proxy for urbanization and better educated work-force, it might be the case that our estimates capture the *effect of education* on political participation. Normally, this should have been a great source of worry. Yet, a look in Table C.2 reveals that, once we instrument for the size of the public sector using the existence of a *sanjak* within the boundaries of a NUTS-3 region, the two groups of regions (treatment-sanjak and control) had almost identical levels of secondary and tertiary education in 2009. Moreover, it is very unlikely that educational attainment levels within each region varied significantly in the last couple of years meaning that even if there were some differences among the two groups there were most likely time-invariant and hence picked-up by our fixed effects estimators (much like all other control variables). Finally, to further strengthen our point, recent empirical evidence that came to surface supports our hypothesis and questions the large and direct effect of education on turnout (Berinsky and Lenz, 2011). They find very little reliable evidence that education significantly increases participation rates. In fact, their findings indicate that education may not be the great "game-changer" when it comes to electoral participation. Instead it may be a proxy of pre-existing conditions. One of those, as we argue, might be the presence of party-group linkages and networks.

Hypothesis 3: Clientelism

With all the above in mind, the last explanation still remaining in the table is that the size of the public sector acts as a proxy of stronger and more resilient clientelistic links as many World Bank studies indicate. The rationale is that in these regions it made sense for the citizens to invest in building closer relations with political parties simply because the probability of those relations paying-off was larger. That is, the expectation of higher rent extraction (e.g. public sector jobs) was mobilizing

voters to participate in the elections and vote for the dominant parties in anticipation of securing some sort of preferential treatment by the state. As a result, stronger linkages between voters and parties were forged in these regions since the market for buying political support was more active. Hence, in the presence of the shock the expectation is that the treatment regions are going to be more adversely impacted by anticipated cuts in government spending and job-creation. The outcome was for turnout to decline by almost 6 percentage-points more, as our empirical findings suggest. Our explanation is that this was due to the fact that the cliental basis of the political system was severely undermined (public spending becomes unavailable).

3.3.4 Discussion of the Results

So far, we have found strong empirical support for the first two hypotheses both at the NUTS-2 and -3 levels. Our findings suggest that there is an important link between trust in the party-system and turnout (Hypothesis 1). Moreover, apart from this channel, our findings suggest that economic adversity affected voter participation in a more rationalistic way through expected economic transfers (public spending and job-creation). That is, we find strong evidence in favor of Hypothesis 2 both at the NUTS-2 and the NUTS-3 level, when we instrument for the size of public sector. The causal link that we identify between the size of the public sector and voter turnout confirms our initial hypothesis that public sector acts as a catalyst that exacerbates the impact of economic adversity (positive or negative) on electoral participation. In our case, the information shock updated for the worse voters' expectations on the scale of spending and job cuts. Thus, public sector size magnified the negative impact of the shock on turnout. Evidence presented yield very strong support for this finding. Moreover, our results are very robust to many alterations of the basic econometric specification (inclusion of treatment leads, year fixed effects, economic

and other controls). In Table C.6, we also conduct a placebo test, moving the intensity to treatment three electoral periods into the past.

With respect to the relative magnitude of the two effects we conclude that, at least for the case of Greece, the relative size of the public sector seems to play a more drastic role in determining political behavior and turnout. This might come as no surprise, given the clientelistic nature of the political system and the strong rent-seeking behavior that voters exhibit (see Appendix A.2). Collecting all evidence together, we conclude that the expected reduction in public spending had an undisputed negative effect on voter turn-out operating via two links: the decline in trust (see Fig. C.7) and expected public spending cuts which affected differentially the regions with larger public sector.

3.4 Conclusions

In this chapter we have attempted to identify the impact of economic adversity on voter turnout by focusing on two links, one direct (rent-seeking) and another indirect (trust), which where either not considered to be that important determinants of turnout (trust) or their effect was largely disputed and ambiguous (economic hardship). This presented us with a double challenge with respect to our identification strategy. The first one was the apparent endogeneity and reverse causality issues with respect to the relationship between economic and political outcomes. Is it the economy that affects political outcomes or vice versa? In order to address this challenge we exploited the information shock in Greece as a natural experiment, where we used the fact that Greek governments falsified fiscal data, that generated a shock on expectations about future public spending and job cuts by the government (economic adversity). This way, we were able to identify the link from expected economic hard-

ship to turnout via rent-seeking voters. The second challenge was on how to identify regions with larger public sector size since another issue of endogeneity arises. It might be the case that public sector expanded exactly in those regions where voters tended to participate more in electoral politics since the parties might have seen a better prospect to invest in linkages there in expectation of getting more votes. As a result, causality might run the other way around. To tackle this problem, we instrumented for public sector size using an instrument from the historical context of Ottoman institutions in the Balkans during the 16th century (existence of an Ottoman military center within the boundaries of modern NUTS-3 region in Greece). Hence, using Greece as a case study (natural experiment) and exploiting its shared institutional past with the Ottoman empire (selection of our IV) allowed us to study both links.

Our findings indicate that both links are important determinants of voter turnout. This in part contrasts the literature that argued that there is no systematic relationship between trust and turnout. We hypothesize that this difference is due to the fact that we focus on trust for the party-system at large not simply government. Our second finding is more in line with literature and the rationalistic rent-seeking incentives of voters who show up in polling stations in expectation of some benefits coming from the sides of the parties. Hence, economic adversity and expectations for anticipated spending cuts (and thus less pork spending and rents) impacted negatively on turnout through this link. This finding is consistent with similar findings in the literature (e.g. Rosenstone, 1982; Wolfinger and Rosenstone, 1980). What is important is that we document the catalytic role that public sector size played in this relationship exacerbating the negative effects of expected cuts on turnout, as evidence we present reveals a larger decline of turnout in those regions. Yet, the exact reason for this differential decline still remains largely unresolved. Though we

find some evidence in favour of our "clientelistic links hypothesis" while rejecting two other alternative stories, our empirical findings only yield partial support to this claim. Hence, we cannot claim conclusively that it was the anticipated weakening of clientelistic linkages that caused the larger decline in turnout in regions with larger public sector share.

These findings can have important policy implications. Apart from uncovering two causal links associated with turnout, we also make a relative assessment of them. We find that in the case of Greece, the relative strength of the rationalistic link (rent-seeking behavior) that operates through the public sector size is larger than that of the normative one (trust on the parties) since the largest component of the decline in turnout in Greek elections, more than a half, can be attributed to the former. As a result, our work highlights a line of caution for policy-making that aims to increase civic engagement and participation in electoral politics. Efforts to increase turnout by increasing transparency and eliminating clientelistic links might have second-order negative effects operating through the rent-seeking link which is found to be quite strong and resilient, at least in Greece. Our work can also offer a potential explanation of why there is significantly lower turnout in the elections for the European Parliament, even among the same countries, despite the fact that trust for EU institutions is equally low with trust towards domestic ones (e.g. political parties). We hypothesize that one potential explanation might be the stronger rationalistic incentives of voters to participate in national elections, either through rent-seeking or through the general economic condition of the state and the effect it has on their individual well-being. Nevertheless, as it is the case with many forms of political participation, determining what makes citizens to vote is still an open question. Therefore, a more systematic study of what determines electoral participation is warranted.

Part II

Appendix

Appendix A

The Greek Case-study

A.1 The Information Shock and the Timing of Events

In this section, we first present a brief time-line of events that lead to two the consecutive revisions of the record of Greek public finances (October 2009 and 2010). Then, it will become more clear why we can exploit the information shock that those revisions generated as a natural experiment. The sequence of events is as follows:

1. In August of 2009, following its defeat on the elections for the European Parliament that took place in June, the conservative Greek Government [New Democracy Party - *Nea Dimokratia*] calls for early elections to take place in October. It cited its inability to execute the Budget for FY2009 as the main reason due to the fact that the forecasted 5% deficit for FY2009 had to be significantly revised upwards (it was projected to exceed 10%).

2. In October 2009, Eurostat in cooperation with Greek statistical authorities announce the results of the audit and revise the FY2009 deficit upwards by almost

8% (approximately 12.8%). Elections take place right after the announcement, amidst a climate of tension caused by the incumbent government's misleading estimates on public deficit and the financial audit process. As a result, the conservative government was largely defeated in the elections by the centre-left party [Greek Socialist Movement - *PASOK*][1]. Yet, voter turnout and electoral fragmentation remained at the previous levels high levels (there was a minor decline in turnout). Moreover, there seems to be *no differential* impact among regions with high and low public sector employment respectively. That is, only the trust link might be operating, if any.

3. In April 2010, a new report published by Eurostat consolidates its estimates on the FY2009 deficit. According to these estimates the deficit soared at 15.8%, approximately 2 points more than anticipated. In the meantime the centre-left government-elect, in collaboration with EU agencies, announces a new fiscal audit that will cover all periods from 2005 and onwards. In May 2010 the Greek government asks for the help of EU and IMF and a package of austerity measures is decided.

4. In October 2010, the final report of Eurostat is published and the FY2009 deficit is finalized at 15.8%, almost 11% more than initially anticipated. Yet, in comparison with previous estimates, the total revision of the Greek public debt for FY2009 alone is an astonishing 24% (from 102% to 126%). Almost half of it (11.7%) is attributed to hidden deficits in the period from 2006-2008 when the previous government was mis-reporting the data. From this 11.7% more than three quarters (or 8.3%) was solely attributed to excess deficit in FY2006.

[1] PASOK gained the 44% of the vote while Nea Dimokratia got a historically low 34%.

5. In November 2010, Regional elections take place, after citizens are exposed to this new information with respect to the hidden deficits throughout the period from 2006 to 2008. The incumbent government [PASOK] is not held accountable since it was the policies of the previous administration that lead to excess deficits and the subsequent austerity measures. As a result, it wins convincingly the local elections securing the victory of its preferred candidates in 8 out of 13 regional administrations (including the Athens Metropolitan Region with 3 million voters) and almost all major municipalities. Yet, as it can be seen in Figures. C1 and C.2 voter turn-out collapses and a new historic-low level is recorded (61% as opposed to 72% one year ago). At the same time (see Fig. B.10) electoral fragmentation sky-rockets to a new record-high level (69%) up from 65% one year ago.

The main reason that allows us to exploit the information shock on the level of public debt comes from the fact that the new information was revealed prior to the local elections but after the national ones. Yet, even though public finances were already in bad shape since 2006, national elections took place without the voters knowing this information. While there is no dramatic change in public finances and the actual economic conditions in the period between October 2009 and October 2010 (there was a small update on the level deficit by almost 2 percentage-points which was signaled by Eurostat earlier that year and, thus was anticipated), there is new information becoming available concerning the status of public finances in the past. Hence, the revelation of the fact that Greek governments used to conceal the true value of public debt and deficits for 2006 and 2007 acts as a shock on the information (there is an overall 12 percentage-point revision on past deficits) which alters significantly voters' expectations on future public spending and job cuts and the intensity of the required austerity and fiscal adjustment without altering current

economic conditions. More so, in regions where public sector employment is larger and the adjustment process (e.g. slashing public sector and freezing public sector employment) is expected to be larger.

The fact that the change in expectations was caused by an information shock solves for us the apparent endogeneity problem, which we have extensively discussed in the previous section. If it were for current fiscal mismanagement causing the revision of deficit and debt in 2010, it would have been impossible to correctly identify the effect of decreased public spending on voter turn-out because the causal link might have been reversed. But fortunately, in our case nothing has changed in the fundamentals of the economy between the two electoral races in October 2009 and November 2010 respectively. The status of the economy was equally bad both in late 2009 and in mid 2010 when the revelation of new data took place. What changed, and with it so did the expectations of the public, was the information on how bad the fiscal position of Greece was back in 2006. But this cannot be attributed to current policies pursued by the current government during the period from 2009 to 2010. Rather, it is an outcome of past policies and most certainly of the clientelistic nature of the party-system in Greece that pre-existed and characterized public life for decades. Hence, exploiting this information shock provides us with the ground for a natural experiment in order to identify the impact of reduced expected public spending on voter turn-out through the link of clientelistic relations. Figure A.1 summarizes the discussion.

A.2 The Greek Party-System: History and Structure

Greece has a stable bipartisan political system since 1974 dominated by two political parties (the centre-right *Nea Dimokratia* and the centre-left *PASOK*) which used to take turns in office. As a result, coalition governments were never occurring. The number of parties contesting elections and represented in Parliament remained relatively stable over the years[2]. The two major parties (*PASOK* and *Nea Dimokratia*) are getting around 80 percent of the votes. Moreover, voter turn-out ranged historically between 75 and 80 percent, meaning that the Greek party-system is characterized by stable bipartisanship and large political participation. That is, the Persson-Tabellini argument that stresses the link between coalition governments and high public spending is not applicable in our case[3].

Apart from its bipartisan nature, another key characteristic of the Greek party-system is clientelism which is at the epicenter of political competition. For years the two major parties used their influence in the administration to favour their clientele by offering public sector appointments and other privileges. Until 1994, when the independent *Supreme State Council for Personnel Selection* [Anotato Simvoulio Epilogis Prosopikou- ASEP] was instituted, public sector was viewed as the prize for the winning party. Consequently, public sector appointments were primarily made according to partisan affiliation and political favoritism, in complete absence of meritocracy. Furthermore, once the *Council* was instituted, the practice of non-meritocratic

[2]In addition to the two major ones there were on average three to four smaller parties. Their combined vote shares never exceeded 20 percent.

[3]In fact, the Greek case provides a counter-argument to Persson & Tabellini. The recent grand-coalition government was an outcome of the economic crisis not a causal factor, since a coalition government has never occured before. It was the severe debt crisis that forced the PASOK government, which held an absolute majority in the Parliament to seek the support of the opposition in passing the austerity measures.

public sector appointments, and the subsequent clientelistic link, passed from the central government to regional administrations which were appointed by the central government until 1994. But even after gaining electoral independence Greek local authorities remained financially and politically dependent on the political parties reducing the level of their autonomy to a simple mid-term ballot opportunity which was used by parties in order to count electoral power with an eye to the forthcoming electoral battle. Hence, partisan favoritism moved from elected parliamentarians to elected local administration officers (e.g. mayors and regional governors) but the clientelistic nature of the Greek political system remained unchanged.

A.2.1 Greek Local Government: Structure and Operation[4]

In this section we present a very brief outline of the structure, functions and sources of income of local government in Greece. Until 1994, the only elected forms of local government were municipal and community councils, representing the first level of local government under the Constitution (Article 102/1)[5]. However, in 1994 the Greek Parliament adopted a reform of the local government system (Laws 2218/94 and 2240/94) establishing elected prefectural administrations at the NUTS-3 level (prefectures)[6]. These laws were formally implemented in January 1995, and the first ever local elections at the prefecture level took place in 1998. Since then, local elections take place regularly every 4 years. These reforms brought about major changes in the system of local government since they introduced another field for

[4]This section is mainly adapted from the Council of Europe report (1994) titled "Structure and Operation of Local and Regional Democracy - Greece" and updated where necessary.

[5]Article 102/1 of the Greek Constitution provides for the institution of local government in the following terms: "The administration of local affairs shall be exercised by local government agencies, the first level of which comprises municipalities and communities. Other levels shall be specified by law".

[6]Laws 2218/94 and 2240/94 established the second level of local government in Greece, which is called *Prefectural Self-Government* and which has no relation with the first level in terms of hierarchy.

political competition.

At regional level Greece is divided into peripheries (NUTS-2 regions), prefectures (NUTS-3 regions) known as *Nomoi.* The basic level of administration are the municipalities [*Demos*], which total 227 at present[7]. The 48 prefectures are "deconcentrated units of central government, covering certain decentralized state services" and their role is to "formulate proposals to the central government on works and policies of national importance concerning the region" (Law 2240/94). Nevertheless, despite the important role that they are supposed to play, in practice, due to inadequate funding, many of those assigned responsibilities still remain in paper. Through the prefectural system, the central authorities also have extensive control over the municipalities. Overall, as the CoE highlights: "... [I]t is not an exaggeration to say that the structure of the Greek local government has not changed very much since the beginning of this century". The reason is that legislative changes were not accompanied by the transfer of real political and financial power to local jurisdictions. As a result, central government still maintains a key role in determining policies, even at the local level.

A.2.2 The Finances of Greek Local Government[8]

According to the report for the Council of Europe (1994): "The proportion of GDP accounted for by the public sector in Greece is approximately 48 per cent, which is only slightly below the average of all the OECD countries. Yet, local governments administrate less than 20 per cent of these resources - equivalent to 8 per cent of the GDP, which is well below the OECD average."

[7] After the last reform of 2006.

[8] This section is mainly adapted from the Council of Europe report (1994) titled "Structure and Operation of Local and Regional Democracy - Greece" and updated where necessary. Some data and tables in this section have been retrieved from Denny and Smith (1993) "Local Taxation - Report to the Commission DG XXI," prepared by the Institute for Fiscal Studies in London.

Expenditures

"Until 1990, the Greek local authorities had fairly limited areas of responsibility, related to elementary services such as water supply, waste collection and recreation. But as part of the administrative reforms implemented in the mid 1990s, there has been a attempt to decentralize some state responsibilities to the Greek local authorities.[9] Yet, this process remains still incomplete. These powers are described in the laws mentioned above (2218/94 and 2240/94) and the transfer is taking place in stages to ensure a smooth transition from the one system to the other," according to the CoE (1994).

The report continues: "When the prefectures were established the functions of local authorities in Greece were split up into areas where the municipalities had the exclusive responsibility, and areas where they shared responsibility with central government. As a consequence of the recent reforms, central government has moved more in the direction of developing powers and functions which can be exercised at local level. Within the coming years all functions of the local authorities will be exclusive and functions such as economic and regional planning will be transferred to the prefectures. Yet, the public housing stock is mostly administrated by the central government.[10]"

The extent to which local authorities are subjected to central government control is evidenced by the CoE: "Within the social sector most of the functions of local authorities involve shared responsibility. Furthermore, local authorities have no independent responsibilities in the educational sector. In areas where local government have the competence, local government is free to raise the quality of services pro-

[9]New areas of responsibility are for instance: child care, elderly care, housing assistance and other welfare services.

[10]The payment of housing benefit and allocation of welfare accommodation to poor people are examples of areas of housing policy in which municipalities with *sufficient* resources have been given authority.

vided to a higher standard depending on the requirements of the local community." In practice though, due to inadequate funding this has rarely occurred. What is most commonly observed is that "... [M]any services which formally fall within the competence of the municipalities are carried out by central government agencies because of the inability of small, financially non-viable local units. These include public utilities, waterworks, irrigation works, sewage systems, roads and other public infrastructure projects" as the CoE report stresses. The majority of local government spending - nearly 70 per cent - goes to capital projects. But, when one takes into account that most capital projects are funded through state grants, it becomes clear that local government discretionary spending falls to less than 10 per cent of its total spending (CoE 1993; Denny and Smith 1994). As a result, in practice local administrations in Greece act as decentralized distributors of central government money rather than autonomous entities.

Revenues

The situation is more or less identical when it comes to local government revenues. Table A.1, from Denny and Smith (1993), shows how Greek local authorities finance their activities. The main source of local revenues are central government transfers - either in the form of tax sharing or grants and subsidies. Another significant component of local government revenues comes from EU's regional development and structural funds. Together, these two sources of finance constitute more than *two-thirds* of total local government revenues.

Denny and Smith (1993) further note that "central government grants has become an increasingly important part of local government revenues over the years. In 1975 these grants only accounted for 16 per cent of the local revenues. Until 1989, grants were split into *ordinary* and *extraordinary* grants. Since then, ordinary grants

have been gradually replaced by a tax revenue sharing system.[11] The receipts from the shared taxes (ordinary grants) are distributed according to a formula primarily based on population density and other social criteria. The funds are allocated to local authorities through a joint decision of the Ministry of Interior and Ministry of Finance. One-third of income tax is used to finance local authority investment, while the rest goes on the current expenses of local authorities."

When it comes to extraordinary grants, contrary to the practices followed by many other European states, there is no formula for their distribution. Hence, there is a great amount of discretion from the central government to direct funds to certain municipalities and localities based on political and opportunistic (partisan) considerations. As a result, the direct line of fiscal responsibility is broken and the voters cannot identify whether the lack of funds in a specific locality is due to inefficient management by the local authorities or due to lack of favoritism by the central government. This aspect of Greek local government further exacerbates its dependency from central government and dominant parties.

Another source of funding can come from various forms of loans. According to the report prepared for the EC "[...] local authorities are, according to law, allowed to borrow from the State, from other public institutions and from private credit institutions. The main credit institution for local governments is the "Loan and Consignment Fund". Loans from this fund can, under certain circumstances, be granted to local authorities at interest rates lower than at the private capital market. Loans account for approximately 10 per cent of local government revenues."

When it comes to local taxes, the Greek municipalities have very limited authority to set their own tax policies. As the CoE report notes: "There are only three types of

[11] Local governments receive shares from the following central government taxes: Personal Income tax: 20% Corporate Income tax: 20% Motor Vehicle tax: 50% Property tax 15%.

taxes over which local government has some control. These are: taxes on electrified areas, taxes on immovable property and the advertisement tax.[12] Most importantly, local governments in Greece have *no legislative power to set or collect local taxes.* All local taxation in Greece are levied under central government legislation. All own taxes are *collected by central government* on behalf of local authorities, although some of the larger municipalities can administer the raising of revenue from taxation." This shows in a very stark manner that the financial autonomy of local government in Greece is severely undermined. In light of the above, it comes as no surprise that local and central politics are so interdependent and interconnected.

A.2.3 Relationship between Local and Central Government

Up until 1989 local government finances were largely dependent on the extent to which the government of the day handed out state subsidies to local authorities. Law no. 1828/89 laid down the specific sources for local government funding with a fixed percentage coming from each source of income[13] (CoE report, 1994). According to the CoE report "[Law no. 1828/89] laid down the foundation for the financial autonomy of local authorities, although, to date, this autonomy has not really been achieved to the extent that it was initially designed. To ensure correct implementation of this law, central government consults local authorities each year through their umbrella organization, the *Central Committee of Greek Municipalities and Communities* (CCGMC), on the distribution of the CAR. In general, the CCGMC is the top level instrument of local government influence on central government decisions. It expresses the demands and proposals of all local authorities and has the role as to central government on topics related to local government. However, the actual

[12] Upper and lower limits for these tax rates are determined by the central government.
[13] These sources of funding are called Central Autonomous Resources (CAR).

involvement of local government in the decisions affecting local government finance is not as enhanced as it should be, and does not match the impact which such decisions have on local authorities (development laws, loans, interest rates etc.)."

A.2.4 The Relationship between National and Local Politics

The lack of financial autonomy of Greek local administration resulted in the lack of autonomy in another equally important sphere: politics. Since most of the resources towards local administrations are coming from a common source, central government, it is not unusual for governments and political parties to interfere very actively in local politics. In fact, in most of the cases, and certainly for the case of prefectural elections, political parties and governments are very actively involved. In other words, local politics are seen as a continuation of central politics at another domain. The most common pattern of involvement in local politics is the following: political parties represented in the Parliament always endorse openly candidates for local elections. Usually, their endorsed candidates are high-profile, high-ranking party officials. Partisan endorsement and affiliation are two extremely important factors for electoral success (only few NUTS-3 administrations have had an independent, non-affiliated and non-endorsed by any party chair-person).[14] As a result, clientelism and partisan favoritism also make their appearance in local politics. The most usual form they take is that of public sector appointments.

Moreover, the similarities among national and local elections extend to the electoral rule, which is a form of PR with a run-off.[15] Hence, there is are incentive for strategic voting neither in national nor in the first round of local elections. Voting for

[14] Party members who disagree with leadership's choices or want to express a general disagreement against its pursued policies may enter the race as "rebel" candidates. This phenomenon is very common in greek local elections since their institution.

[15] In local elections, if no candidate gets the absolute majority a second round takes place.

a non-winning candidate endorsed by a smaller party won't affect the final outcome.[16] Since we measure electoral fragmentation and voter turnout during the first round of local elections, when all candidates and parties participate in the electoral contest, the two electoral rules are equivalent in terms of induced voting behavior. Moreover, the existence of a run-off ensures that no coalition administration ever takes place at the local level, another similarity between national and local politics. Therefore, there is no need to worry about the impact of coalition governments, through the electoral rule, on economic outcomes.

For all the above reasons, local elections are highly politicized. Moreover, the fact that they take place every four years between national elections, gives them a flavour of mid-term elections where the performance of government is implicitly evaluated. Hence, electoral and voting behavior in local elections is almost identical with national ones. Stylized evidence in Figures B.11 through B.13 and C.5 provide a very good visualization of this point. Both within and across groups, voting behavior (electoral fragmentation) and turnout in local elections appears to follow an identical trend with national ones. In most cases the two lines coincide. Therefore, we conclude that local elections act as a proxy for mid-term national Elections. Since the political characteristics between national and local elections are identical we need not worry for combining electoral data from both of them in our analysis.

A.3 Constructing our IV

In our sample, we have data on greek elections (local and national) from 1996 until 2010. In total we have 423 observations at the NUTS-3 level. There are 48 NUTS-3

[16] If there is a winner in the first round this means that she got more than 50% of the total votes. Hence, voting strategically would have had no effect. On the other hand, if no candidate gets the absolute majority in the first round, the run-off takes place among the first two in the previous round. The equivalence of those two electoral systems is also stressed by Duverger (1954).

regions in Greece. We assign 23 out of those 48 regions (accounting for the 60% of the population) to the treatment group, using the presence of an Ottoman Military District Head-Quarters (known as *Sanjak HQ*), within the current administrative boundaries of a NUTS-3 region, as an instrumental variable (IV) in order to identify those regions with larger public sector size and employment. The rationale for the choice of our IV is explained in the next section. The remaining 25 regions are assigned to the control group. In those regions, the main sources or economic activity and employment are non-government related (e.g. tourism and agriculture). Table A.2 shows a comprehensive list of all the locations that the HQs of Ottoman Military Districts (*sanjak*) were stationed within the territorial boundaries of the area that constitutes today modern Greece, during the 16^{th} and 17^{th} centuries.

One of the first things that one can observe is that the degree of institutional continuity and similarity, not only at the local level (NUTS-3) but also at the higher ranks of administration (NUTS-2) is remarkable. More than 80% of the HQs of Ottoman *sanjak* were situated in the exact same location where current prefectural administrative capitals of Greek NUTS-3 regions (*Nomoi*) are stationed, as comparison between Columns 3 and 4 illustrates. Furthermore, comparing Columns 1 and 5, it becomes clear that even at the higher administrative level (*Periphery* or NUTS-2) the jurisdictions between Ottoman *Eyâlet-i* and *Vilâet-i* and Greek *Peripheries* are very similar. Most of Greek prefectures (*Nomoi*) that used to belong to the same Periphery (NUTS-2) were also Ottoman *sanjak* that used to belong to the same *Eyâlet-i* or *Vilâet-i.* Hence, not only the structure and jurisdiction of an Ottoman *sanjak* was similar to that of a Greek prefecture, but even at higher administrative level, there appears to be a major overlap. This further strengthens our argument in favor of using the existence of Ottoman *sanjak* as an instrument for regions with larger public sector size.

In constructing our IV we adapted the following convention: we generated a dummy variable $(Sanjak\_HQ)_s$, that takes the value of 1, if at region (NUTS-3) s an Ottoman sanjak was stationed during the past. As a result, all the NUTS-3 regions included in Table A.2 belong in to this category. In order to identify which regions used to house an Ottoman military HQ, we relied on three different sources: Kiliç (1999), Malte-Brun and Huot (1834), and Skene (1851). For reasons of consistency and historical accuracy, we included a region in the list of Table A.2 only if it appeared as having a *sanjak HQ* within its boundaries in at least two out of the three sources mentioned previously. This way, given that historical archives of that times present some inconsistencies, we can increase the accuracy of our IV. As a result, the *sanjak HQs* that we list in Table A.2 together with the actual locality that were stationed was cross-references across various sources. Furthermore, extra care was taken to identify the exact place where the HQ was situated since it was very common for places to change names regularly, especially during their transition from the Ottoman Empire to the modern Greek state that was created in 1831 and kept expanding until the beginning of the 20^{th} century. Columns 2 and 3 (Table A.2) are presenting both the original Turkish names of the *sanjak HQs* and the subsequently adapted Greek names to make sure that we have identified them properly. In sum, we have identified 23 such NUTS-3 regions (prefectures) and we have assigned them to the treatment group. That is,.the dummy $(Sanjak\_HQ)_s = 1$ if s is a NUTS-3 region that is listed in Table A.2. Summary statistics for these two groups are presented in Table C.2. Next, we discuss in more detail the rationale behind the use of our Instrumental Variable.

A.3.1 From Ottoman Reforms to the Modern Greek State

In this section, we will explain how the existence of an Ottoman military district (known as *sanjak*) head-quarter, during the 17^{th} century, within the administrative boundaries of a current NUTS-3 region (*Nomoi*) can be used as an instrument for this region exhibiting higher share of public sector employment (and growth rate). To justify this choice, we need to take a step back to the early years of Ottoman presence in the Balkan peninsula. In a seminal paper, Inalcık (1954, *Islamic Studies*), a prominent scholar of Ottoman history, showed that the method of Ottoman conquest had two stages: an indirect one, where the aim was to establish suzerainty, and a direct one that proceeded with the elimination of native dynasties and the application of the *tımar* system aiming at gradual assimilation. Quickly after conquest, the Ottoman army was withdrawn and small garrisons were placed in fortresses of strategic importance in order to minimize the size of the occupying force and the risk of resistance emerging from local population (efficient allocation of military resources). *Tımars* were then distributed to the elite Ottoman cavalry aristocrats (*Sipâhis*) thus, imposing a feudal system of governance much like in many European medieval states. *Tımars* that were stationed near fortresses of strategic geographical importance (*Hisar-eri*) constituted the centres of Ottoman military and administrative command.

Moreover, conquered lands were usually preserved in their pre-Ottoman administrative boundaries and they were entrusted to a regional commander (*sanjak bey*) according to size and importance. In practice *sanjak* was the real administrative and military unit of the Ottoman Empire. *Sanjak Bey* (Local Lord) was the commander of the tımar-holding *sipâhis* (knights) in his *sanjak*. Many *sanjaks* together formed the larger administrative units of the Ottoman Empire (*Eyâlet-i* and *Vilâyet-i*). As

a result, Ottoman conquest methods were based on maintaining previously existing structures, to a great extend, and bringing slow and non-revolutionary changes from time to time (Inalcık, 1954). This non-revolutionary method of conquest was maintained throughout the Ottoman history.

In the mid-18th century, technology that was developed during the Industrial Revolution began to make its impact on military and naval warfare (Kennedy, 1989). The uneven patterns of industrial and technological change coupled with changes in the financial sector, which were triggered by increased industrialism (Harrison, 2011), caused major shifts in the balance of power among great powers of that time (English, Austrian, Russian and Ottoman Empires). These changes, in turn, affected the outcome of 19th century wars more than ever before. As a result, steam engines and machine-made tools gave Europe decisive military advantages over less technologically and financially advanced empires (e.g. Ottoman, Russian). The consequence of industrial revolution was for the United Kingdom to become the unchallenged global superpower that threatened the Ottoman dominance in Eastern Mediterranean.

In the eve of the 19th century, addressing growing military challenges by the western powers, Sultan Mahmud II initiated in 1826 his Reform Program (*Tanzimât*) of centralization and westernization of the military structures of the Ottoman state (Quataert, Pamuk et al., eds. Inalcık, 1994; pp. 761-69). During the period of the Reforms (*Tanzimât*), which lasted until 1877-78, western bureaucrats and military experts from France and Austria replaced Sultan's officials in charge of *sanjak* HQ's. This state-imposed reforms percolated from the top to the bottom. Rather than being an outcome of grassroots societal change, they aspired to change the societal structures and norms. As a result, the scope, responsibility and sheer size of Ottoman government grew in an unprecedented manner. By the end of the 19th century the

state employed more than one million civil servants (Quataert, Pamuk et al., 1994).

The newly-formed Greek state gained its independence from the Ottomans in 1831 comprising only Peloponnese and some islands. Yet, it expanded gradually throughout the 19th and early 20th centuries (1881-1913) at the expense of the Ottoman Empire by annexing gradually the seceding lands of the Empire. But the Greek state was resource constrained and was relying heavily on foreign aid (military and financial), infrastructure and state-building. Since the creation of the Greek state was happening in parallel (with a small time lag) with the modernization of the Ottoman state, foreign experts were called-upon to help in a manner analogous to that they have done couple of years before for the Ottomans[17]. As a result, since the re-organization of the Ottoman state was taking place in parallel with the creation of the first-ever Greek state infrastructures, the Greek state utilized the same structures and techniques that have developed for the Ottomans during the Tanzimât period. In fact, the degree of institutional continuity between pre- and post-Ottoman Greece is astonishing. As Kostis (2005) notes, the newly-adapted "westernized" institutions were nothing more than the old pre-existing Ottoman institutions, which were renamed (e.g. the *Assembly of Notables* became the new *Parliament*) and continued to be occupied by the same families. Hence, the Ottoman *sanjak* became the Greek equivalent of *Nomoi* (a term maintained until nowadays to designate the administrative HQ of a NUTS-3 region).

[17]Bavarians assumed the responsibility to organize the bureaucracy, civil administration and education, whereas French experts assumed the responsibility of military re-organization.

A.4 Figures

								Deficit			
Debt/GDP (%)	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010**	*'08-'09*	*07-'08*	*06-'07*	*05-'06*
Notification of 04.2009	98.6	98.8	95.9	94.8	97.6	*102.6*		**5**	2.8	-1.1	
Notification of 10.2009	98.6	100	97.1	95.6	99.2	*113*		**13.8**	3.6	-1.5	
Notificantion of 04.2010			97.8	95.7	99.2	114.6	125*	**15.4**	**3.5**	**-2.1**	**-2.2**
Notification of 10.2010			106.1	105	110.3	125.8	136.5*	**15.5**	**5.3**	**-1.1**	**6.1**
Change April-October 2010			**8.3**	**9.3**	**11.1**	**11.2**		**0.1**	**1.8**	**1**	**8.3**

Note: Data with asterisk (*) on 2010 are estimates made at that time by Eurostat

Fig. A.1: Revised Data on Greek Public Finances (Debt and Deficit) as % of GDP for the Period from 2004-2010 (reported by Eurostat on October 2010)

A.5 Tables

Table A.1: *Sources of Financing of Municipal and Prefectural (NUTS-3 Regions) Gross Expenditure in late 1990s.*

Sources of Revenue	Percentage (%) of Gross Expenditure
Fees and Charges	25
Extraordinary Grants (from Central Govt.)	24
General Taxes (collected by Govt.)	29
Loans (Private and Formal Sector combined)	10
Immovable Property Income	4
Sale of Property	1
Local Taxes (collected by Local Administrations)	5
Other Sources	2
Total	100

Note: *Figures taken from Council of Europe: "Structure and operation of local and regional democracy - Greece", CoE, Strasbourg. Data updated using information from the Greek Ministry of Interior, Administrative Affairs, Local Government and Decentralization when necessary.*

Table A.2: *The Allocation of Ottoman Military District (Sanjak) Head-Quarters during the* 16^{th}-18^{th} *cent. across the Administrative Boundaries of present-time Greek Regions (Nomos) at the NUTS-3 Level.*

Region Name	(1)	(2)	(3)	(4)	(5)
Nomos	Eyâlet-i or	Sanjak HQ		Modern Capital	Periphery
(NUTS-3)	Vilâyet-i	Ottoman	Greek	(NUTS-3 Region)	(NUTS-2)
Evros	V. Edirne	Dedeağaç	Alexandroupoli	Alexandroupoli	Thrace
Rodopi	"	Gümülcüne	Komotini	Komotini	"
Kavala	V. Sêlanık†	Taszos	Thasos	Kavala*	E. Macedonia
Kavala	"	Kavala	Kavala	Kavala	"
Drama	V. Sêlanık	Drama	Drama	Drama	"
Serres	"	Siriz	Serres	Serres	C. Macedonia
Thessalonica	"	Sêlanık	Thessalonica	Thessalonica	"
Kozani	E. Monastır	Serfiçe	Servia Kozanis	Kozani*	W. Macedonia
Kastoria	"	Kesriyé	Kastoria	Kastoria	"
Ioannina	V. Yanya	Yanya	Ioannina	Ioannina	Epirus
Arta	"	Narda	Arta	Arta	"
Larissa	E. Rumeli	Yenişehir	Larissa	Larissa	Thessalia
Trikala	"	Tırhala	Trikala	Trikala	"
Magnissia	"	Velestinye	Velestino	Volos*	"
Aitolia	V. Morea†	Nafpaktos	Nafpaktos	Agrinio*	W. Greece
Achaia	"	Balıbadra	Patra	Patra	"
Korinthos	V. Morea†	Gördes	Korinthos	Korinthos	Peloponnese
Arcadia	"	Triblıçe	Tripolis	Tripolis	"
Argolida	"	Anabolı	Nafplio	Nafplio	"
Chania	E. Girit	Canea	Chania	Chania	Crete
Heraklio	E. Girit	Candia	Chandakas‡	Heraklio	"
Lesvos	E. Archipelago	Mıdıllı	Mitilene	Mitilene	North Agean
Lesvos	"	Limna	Limnos	Limnos*	"
Chios	"	Sakız	Chios	Chios	"
Dodekanese	"	Rodoz	Rhodos	Rhodes	South Agean
Kerkyra	V. Yanya†	Kerkira	Kerkyra	Corfu	Ionian

Note: *Data compiled from Kiliç (1999), Malte-Brun and Huot (1834), and Skene (1851). Greek Nomoi (NUTS-3) appearing twice imply that within their administrative boundaries multiple Ottoman military HQ existed. In 1998, Evros and Rodopi have been unified into a single NUTS-3 Region. As a result, the actual number of NUTS-3 regions that housed a Sanjak in their jurisdictions is 23. Eyâlet-i was the major Ottoman Administrative District (equivalent to a Periphery at the NUTS-2 level). Vilâyet-i is a more modern version of the previous structure adapted prior to the Reforms when redistricting took place.* † *Regions which prior to redistricting belonged to Rumeli Eyâlet-i (a large region covering most of continental Greece and Peloponnese) before it was broken into smaller administrative units (Vilâyet-i).* ‡ *Chandakas is the Byzantine (early-Greek) name for Heraklio.*

Table A.3: *Summary Regional Statistics (at the NUTS-3 level) of High and Low Public Sector Groups for the period from 2000 to 2010.*

	(1)	(2)
	Treatment (High Public Sector)	Control (Low Public Sector)
Annual Income p.c. (Harmonized PPP)		
2000-08 Averages	14,808	15,103
2000	11,516	11,603
Education Level (2000-2010 Averages)		
Secondary (%)	36.6	36.0
Tertiary (%)	24.1	23.9
Employment Sector Shares (2000-08 Averages)		
Agriculture (%)	18.7	20.5
Industry (%)	21.6	20.5
Share of Public Sector Employment (% of total)		
In 2000	22.1	18.3
In 2008	27.2	21.4
Average 2000-2008	25.0	20.1
Growth Rate (2000-08)	24.5	17.5
Public Sector Jobs (%)		
(relative share of total public sector)	80.0	20.0
(relative share with agriculture)	1.5	1.1
Unemployment (2000-2009 Averages)	8.3	7.7
Long-Run Unemployment	4.0	3.9
Long-Run Unemployment (share of total %)	48.2	50.6
Number of NUTS-3 Regions	22	26

Note: *Data on educational attainment are taken from ELSTAT (Greek Statistical Authority)Population Census (2011). Data on regional unemployment (NUTS-3 level), income and public sector employment statistics are taken from the Eurostat Regional Yearbook (2010) and LFS Survey (2009). Income is measured in Harmonized PPP. Public sector employment is given as a share of total employment.*

Appendix B

Supplementary Material for Chapter 2

B.1 An Implicit Test on our Redistributive Mechanism

So far, we have not tested our mechanism of redistributive politics per se (Proposition 4). We provide one such tests here. As the reader may recall, we have shown that as the two moderate parties converge ideologically, the two extremists will be *less willing* to be strategical and "sacrifice" even a tiny vote share, by promising lower redistribution, in order to increase the probability that their ideological neighbor becomes the *formateur*, simply because such a neighbor does not exist anymore (it has converged to the median). Hence, they prefer to match-up the redistribution promises of the moderate parties, leading to an equilibrium in which the redistribution (economic policy) dimension is practically cancelled out. As a result, our proposed link, through which unemployment affects electoral fragmentation, cannot be as effective as before. Thus, if our model has correctly identified the *redistributive*

voting mechanism through which unemployment affects electoral fragmentation, we should expect that as moderate parties move towards the median policy, fragmentation should not vary significantly with the unemployment rate. The effect has to be much more weak once the above channel has been shut off.

In practical terms, this implies that if we estimate our basic IV model on a restricted sample of countries, where moderate parties exhibit a very high degree of ideological proximity, we should find that the impact of unemployment on electoral fragmentation is much lower. Perhaps it might even fail to be statistically significant, as the coefficient β_1 on unemployment becomes smaller in magnitude, yet negative number. To test this prediction, we split our sample into two sub-groups. The first group contains the countries where the moderate parties have converged in terms of ideology[1]. The second one contains those countries where the dominant parties exhibit high ideological divergence. Based on this separation, we estimate our IV model on the first group. We present the results in Table 9 (Appendix B).

It is reassuring to observe that the estimation results on the restricted sample of countries confirm our expectations. That is, they offer strong support in favor of our model's specifications. We can see that in all specifications, irrespective of the choice of our instrument and the inclusion or not of extra controls, the coefficient on unemployment is always negative and strictly smaller in absolute value (range from -0.8 to -0.4) compared to the estimates in Table 5 (-1.3). That is, on average, its size drops to almost a half. It also fails to be statistically significant, under all alternative specifications and for any conventional level of statistical significance. We note the fact that our first-stage estimates are statistically significant at the 1% level under all specifications, and also the fact that the coefficients on all other explana-

[1] According to the Schmidt Index. Figure B.9 shows the degree of ideological distance among dominant parties in the OECD countries from 1960 to 2007.

tory variables of interest (e.g. institutional constraints and incumbency dummy) are statistically significant, have the same sign and are identical in magnitude with the respective ones in Table 5 (e.g. the coefficient on institutional constraints is around 0.6 in both cases). As a result, taken altogether, it becomes clear that our estimate on the coefficient on unemployment became smaller in magnitude and lost its significance due to the fact that we our mechanism is "switched-off" in this particular sub-sample. Hence, the data lend some indirect support to the model's mechanism and structural elements as well.

B.2 The Economics Behind our Instrument: Oil Prices and Unemployment

To understand the validity of our instrument we need to summarize the economic relationship between oil price shocks and unemployment. Firstly, there is a growing consensus among the literature, that the effects of an oil price shock on unemployment were not constant overtime. Especially after the 1974 oil crisis, the impact of oil price shocks on the macroeconomy has changed. In a early paper, van Wijnbergen (1985) presents a theoretical model of inter-temporal analysis, where there is disequilibrium in the goods and labour market in the first period, in order to study the effect of oil price shocks on the labour market and the current account. Although his analysis focuses mainly on the 1974-75 oil crisis, it can provide some critical insight on what might have happened after the 1970s. Van Wijnbergen argues that in the very short run the supply shock in the goods market, caused by an increase in oil prices, dominates and causes unemployment to increase. Yet, in the medium and long run the labour market adjusts. The increase in the price level causes real wage to fall below the worker's productivity and hence firms are willing to employ more

and produce more, given demand. Then, if the hike in inflation is met by a cut in the rate of interest, investment will increase and there will be excess demand in both labour and goods markets. Especially for the economies that run CA deficits the effect of increased investment on employment will be larger[2]. This increase in investment makes the long-run effect of an increase in oil prices on employment to be positive. That is, the initial negative shock that drives unemployment upwards, is quickly reversed. Stylized facts on the US economy during the 1975 oil crisis confirm this analysis. Unemployment in the US reached its peak in mid-1975 to rebound shortly afterwards and start declining due to the effect on the real wage.

One potential explanation for this is the ability of enterprises and industry to better absorb the costs of higher oil prices by means of passing the effect on the consumers or by having stocks of output so that it can suspend production or even shift production to less oil intensive goods. To the extend that consumers are more adversely affected by rising oil prices compared to the industry, and to the extend that degree of substitutability is large enough, we can expect the effect of falling real wage to dominate over rising costs of production. Hence, after an initial negative shock on employment, we can expect that soon enough employment picks up again.

In support of this latter hypothesis comes the paper by Keane and Prasad (1996), who study the effects of oil prices on real wage and employment, using panel data from the National Longitudinal Survey of Young Men in the US. In their paper, they find that while the short-run effect of an oil price increase on employment is negative, the long-run effect is in fact positive. The main reason for this finding is that increases in the price of oil unambiguously cause real wage to decline at the aggregate level in all sectors of industry. Moreover, they estimate that the fall on real

[2] We note that at the time of this analysis refers to (mid seventies) the developed European Union incorporated only 6 member states and many of our OECD economies (Greece, Spain, Portugal and others) were considered to be developing ones.

wage is on the level of 4-5% for a standard deviation increase in the price of oil (19% approximately). Since the effect of an oil price increase on labour demand depends on the degree of substitutability between oil and labour, they explain their finding by noting that labour and oil are not gross but net substitutes. As a result, the fall in real wage is to be expected. Hence, they conclude that it is those changes in relative wages and the sectorial changes in the labour market induced by the higher oil prices that can explain the positive effect on employment.

Blanchard and Gali (2007) study the structural changes in the labour market induced by oil price changes, by applying structural VAR techniques in a sample of advanced OECD economies to estimate the impact of an oil price shock to unemployment, inflation and output. In this sense their findings, given their time span and the set of countries are directly relevant to our present study. They derive three main conclusions: Firstly, the impact of oil price shocks on the macroeconomy has changed over time and in particular after the 1980s. In that respect the episodes of 1974 are not identical with those that followed afterwards. Secondly, they attest that oil price shocks overtime have driven labour markets to become more flexible, and thirdly, that due the shocks the share of oil in production has decreased overtime.

In particular, with respect to unemployment and real wage, they show that the magnitude and the direction vary between the episodes of 1973 and 1979 and the episodes in early 2000. While unemployment rises sharply during the episodes of the 1970s, this trend reverses in the 1999-2000 episode where unemployment falls in a response to an increase in the oil prices. Moreover, in the 2002-2005 episode unemployment is declining while oil prices are still on the rise. Given that our sample contains data after 1970 for the majority of the countries, it is normal to expect b_1 to be slightly negative. They estimated that CPI inflation and wage inflation reach their peak at Q.4 after the incidence of an oil episode. This implies that due to more

flexible labour markets and the fall in the real wage, employment starts to pick up during Q.4 and unemployment starts to decline in the same time. In addition, they show that this trend is more characteristic of the late 1990s oil shocks, especially for countries like Japan, France and Germany.

In light of the above, our estimates on coefficient b_1 should not come as a surprise, given that we use the one year lagged industry-weighted price of imported oil as our exogenous instrument. Table 6 (Appendix B) summarizes the first stage results of our IV model, presented in Table 5 (Appendix B). Columns (1) to (6) in Table 6 are the corresponding first-stage regressions of the IV models presented in Columns (1) through (6) in Table 5.

Our estimates on the impact of an oil price increase on unemployment are robust under all specifications. In all five of them we find the effect to be negative and statistically significant at the 1% level. Furthermore, the F statistic on the excluded instrument is above the value of 10, under all alternative specifications. Since the estimates on our first stage regressions have an economic interpretation, and moreover they are highly statistically significant under all specifications, we conclude that the lag or real oil prices is a valid instrument. After conducting a series of tests, we conclude that our instrument is neither weak (as evidence from the first stage show) nor invalid (as the Hausman test statistic suggests). In Table B.8, we reproduce the results of Table 4 (Appendix B) under alternative specifications using different versions of our instrument and other estimators (GMM). Since all of them are qualitatively equivalent and are numerically close, we have decided to focus only on this specification, since the instrument we use is the simplest possible one.

The reason for not employing more complex indexation in measuring oil price shocks is that introducing more complicated techniques might compromise our data and allow room for extra critique directed at our instruments. In a sense, if industrial

intensity-weighted, real oil prices are not on their own a valid instrument for unemployment, then, it would be hard to argue that more indexation would make this relationship to be statistically significant. Furthermore, what is more reassuring, is the fact that our IV model is extremely robust in the use of alternative techniques in measuring the oil price shocks. In Table 8 (Appendix B), we present the estimates of our Model in Table 5 using an alternative instrument: the trend component of real imported oil prices at refinery.[3] The main reason for using the trend component of oil prices is the ability to capture the long-run evolution of oil prices based on global demand and not the cyclical component of the price attributed to political events. We present the estimates of this model on Column (5) on the restricted sample. Since the coefficient estimates are statistically significant at the 1% level, negative and almost equal in magnitude (-1.7 compared to -1.8) we think that there is no need to elaborate further on this technique.

In the remaining columns, we use the predicted residuals on oil price, after we allow it follow an AR(2) process.[4] Since there is extensive literature suggesting this technique,. we estimate the following model:

$$P_{i,t} = \phi_{i,0} + \phi_{i,1} P_{i,t-1} + \phi_{i,2} P_{i,t-2} + u_{i,t}$$

so that the 2^{nd} Stage becomes:

$$q_{i,t} = b_0 + b_1 \hat{u}_{i,t} + X'_{i,t}\gamma + a_i + \lambda_t + \varepsilon_{i,t}$$

and the 3^{rd} Stage becomes:

$$F_{i,t} = \beta_0 + \beta_1 * \hat{q}_{i,t} + X'_{i,t}\gamma + a_i + \lambda_t + \xi_{i,t},$$

[3] To de-trend the oil prices we use the Hoddrick-Prescott filter with smoothing parameter 6.25, given that we have yearly observations.

[4] The choice of an AR(2) process was far from being arbitrary. Given that we observed systematic and significant auto-correlation on all the residuals until the second lag, we concluded that an AR(2) process was the optimal way to get the most accurate estimations on the real oil price shocks.

where $\hat{u}_{i,t}$ is the predicted residual of the above AR(2) process on $P_{i,t}$ and all the other controls remain the same as before.

Once more, we observe that our estimation results do not change dramatically compared to our estimates in Tables B.4 and B.5. All the coefficients on unemployment are highly statistically significant and the estimated values are all negative and quite close in magnitude, ranging from -1.5 to -1.8. Moreover, in all cases the F statistic on the excluded instrument is larger than the desired critical value. As a result, we have decided to include our estimates as a further robustness check, but we think that more discussion about the AR(2) process is not warranted in this section.

B.3 The Just-Indentified Model with the Quadratic Term

As explained in the main text, in order to address the concerns of weak instruments, an outcome of using two endogenous regressors and averaging the data at the election term level, which necessitated the use of multiple instruments (oil price shock lags), we have resorted to the following solution: reducing the number of endogenous regressors to just one (we used the linear term) and estimating the simplest possible model (the just-identified IV model, using our single best instrument). While this completely resolved the problem of weak instruments (as Table 5 clearly demonstrates) it generated another minor concern. How to estimate a *non-monotonic* (convex) relationship between unemployment and fragmentation when using a *single* regressor: the linear term of unemployment? We have explained in great detail in the main text why this should not be a major concern.[5] Nevertheless, in this sec-

[5] In fact, we have made the claim that estimating the just-identified IV model with the linear term and a single instrument actually strengthens our point.

tion we repeat our estimation of the just-identified IV model, this time using the *quadratic term* of unemployment. Our goal is to show the existence of a convex relationship between unemployment and electoral fragmentation. Formally, we estimate the following model:

$$(q_{i,t} - \hat{Q}_{\min})^2 = b_0 + b_1 \cdot \hat{u}_{i,t-1} + \boldsymbol{X}'_{i,t}\boldsymbol{\gamma} + \alpha_i + \lambda_t + \xi_{i,t}$$

and

$$F_{i,t} = \pi_0 + \pi_1 \widehat{(q_{i,t} - \hat{Q}_{\min})^2} + \boldsymbol{X}'_{i,t}\gamma + \alpha_i + \lambda_t + \varepsilon_{i,t}$$

where $\hat{Q}_{\min}$ is the argument that minimizes the second stage predicted equation of the 2SLS model. Formally, we define $\hat{Q}_{\min} \equiv -\frac{\hat{\beta}_1^{2SLS}}{2\hat{\beta}_2^{2SLS}}$, where $\hat{\beta}_1^{2SLS}$ and $\hat{\beta}_2^{2SLS}$ are the predicted coefficients of the estimated 2SLS second-stage equation (see Chapter 2, Section 2.2.5).[6]

The reason for including this *modified* quadratic term is the following: Given the absence of a linear term from our model (to allow for the use of one instrument), in order for our coefficient estimate π_1 on the quadratic term to be meaningful we need to use the square of the term $(q_{i,t} - \hat{Q}_{\min})$ which measures the deviations from the critical value of unemployment $\hat{Q}_{\min}$.[7] We expect $\pi_1 > 0$. We present the results of those estimates in Table 12 (Appendix B). In all specifications the coefficient on the quadratic term is positive and statistically significant at any conventional level. Moreover, the $F-$statistic of the excluded first-stage IV is significantly larger than 10, well above the critical zone, in almost all specifications (see also Table 8,

[6]Recall we have estimated the following second-stage equation: $F_{i,t} = \beta_0 + \boldsymbol{\beta} \cdot \hat{\boldsymbol{Z}}'_{i,t} + X'_{i,t}\gamma + \alpha_i + \lambda_t + \eta_{i,t}$ where $\boldsymbol{\beta} = (\beta_1^{2SLS}, \beta_2^{2SLS})$

[7]In practice, by estimating square deviations of unemployment from $\hat{Q}_{\min}$ we effectivelly transpose the symmetry axis of the second-stage equation from zero to $\hat{Q}_{\min}$. As a result, we can generate observations on the negative quadrant of the x-axis and our estimate relationship becomes meaningful.

Appendix B). Finally, the coefficient on institutional constraints is again positive (1.7) and statistically significant.[8] Hence, we conclude that there is no need to worry about weak instruments, since all the alternative estimation methods that we have employed (LIML estimator, just-identified IV models with both the linear and the squared terms) produced identical results that yield strong support to our first hypothesis (**H1**): the convex relationship between unemployment and electoral fragmentation.

B.4 Characterization Result for Mixed-strategy Equilibria

Proposition 8 characterizes our mixed-strategy equilibria for every $\epsilon \in (0, \frac{1}{2})$.

Proposition 8 *For every $q \in (0,1)$, every $m \in (0, M)$, every $\tau \in (0,1)$, and every $\epsilon \in (0, \frac{1}{2})$, $\exists\ \tau_\epsilon < \tau$ such that the following vector $\boldsymbol{\sigma}^*_\epsilon(\boldsymbol{t}) = (\sigma^*_l(t_l) = \sigma^*_r(t_r); \sigma^*_L(t_L) = \sigma^*_R(t_R))$ constitutes a **symmetric** equilibrium of the electoral game in mixed strategies, where σ^*_l and σ^*_r are non-degenerate with support on $[0, \tau]$ and $E[\sigma^*_l(t_l)] = E[\sigma^*_r(t_r)] = \tau_\epsilon < \tau$, whereas σ^*_L, σ^*_R are the degenerate strategies with $\sigma^*_L(\tau) = \sigma^*_R(\tau) = 1$.*

Proof of Proposition 8. For $\epsilon > \hat{\epsilon}$ it suffices to consider the degenerate mix-strategies $\sigma^*_l(t_l = 0) = \sigma^*_r(t_r = 0) = 1$ and $\sigma^*_L(t_L = \tau) = \sigma^*_R(t_R = \tau) = 1$. Then, we have Proposition 1.

For $\epsilon < \hat{\epsilon}$, note that by Lemma 2 L and R have a strictly dominant strategy $t^*_L = t^*_R = \tau$. Then, w.l.o.g. we can fix $t^*_L = t^*_R = \tau$ and restrict attention to the reduced two-player game $G = (\mathcal{T}_p, V_p)_{p \in \{l,r\}}$, where $\mathcal{T}_p = [0, \tau]$. Then, we have a

[8] With one noteable exception when we use averaged data, since aggregation eliminates much of the variation.

standard game with discontinuous payoffs. Observe that for $\epsilon < \hat{\epsilon}$ the constraint $v_r(t'_r = \tau) - v_r(t''_r) \leq \epsilon$ is not always satisfied (see Fig. B.15.b). As a result, undercutting is *not* always profitable. That is, there exist values of ϵ such that the gain in implemented ideology (ϵ) does not suffice to offset the incurred loss in the vote share. Hence, the game has no pure-strategy equilibria[9].

Yet, there exist a symmetric equilibrium in mixed strategies. First, note that game $G = (\mathcal{T}_p, V_p)_{p\in\{l,r\}}$ is a *symmetric* in pure strategies*, compact, Hausdorff* game, since $\mathcal{T}_p$ is a compact *Hausdorff* space. In order to show that game G possesses a symmetric mixed strategy Nash equilibrium we need only show that its mixed extension $\bar{G}$ is *better-reply secure*[10] along the diagonal, since *quasi-symmetry* of $\bar{G}$ follows from the symmetry of G (Corollary 1.3; Reny, 1999). Consider the mixed extension of the game $\bar{G} = (\Sigma_p, V_p)_{p\in\{l,r\}}$, where we extend each V_p to $\Sigma = \Sigma_l \times \Sigma_r$ by defining

$$V_p(\sigma_l, \sigma_r) = \int_0^\tau \int_0^\tau V_p(t_l, t_r).d\sigma_l d\sigma_r \text{ for all } (\sigma_l, \sigma_r) \in \mathbf{\Sigma}.$$

Then, in turn, better–reply security of $\bar{G}$ implies two conditions: (i) *reciprocal upper semi-continuity* and (ii) *payoff security* along the diagonal. For (i) we only need to verify that the sum of the payoffs of the two parties $\sum_p V_p(\boldsymbol{t})$ is u.s.c. in $\boldsymbol{t}$ on $\boldsymbol{\mathcal{T}}$**.** Then, by Proposition 5.1 (Reny, 1999) $\sum_p \int_{\mathcal{T}} V_p(\boldsymbol{t}).d\boldsymbol{\sigma}$ is also u.s.c. in $\boldsymbol{\sigma}$ on $\mathbf{\Sigma}$ and the mixed extension game $\bar{G}$ is reciprocally u.s.c. The payoff function for party r (and by symmetry l) is as follows:

[9]Clearly, $t_r = t_l = \tau$ cannot be an equilibrium because a Bertrand-style induced competition will eventually lead to $t_r = t_l = 0$. But this cannot be an equilibrium either because r (or l) can go all the way and promise $t_r = \tau$ since the gain in vote share $\max\langle v_l(t'_l = \tau) - v_l(t''_l = 0)\rangle = \hat{\epsilon}$ exceeds the loss in utility ϵ that is now incurred by the fact that party L wins with certainty.

[10]We would like to thank Philip Reny for suggesting the use of better-reply security in prooving the result.

$$V_r(t_r, t_l) = \begin{cases} -\frac{1}{2} + \epsilon + v_r(t_r, t_l), & \text{if } t_r < t_l \\ -\frac{1}{2} + v_r(t_r, t_l), & \text{if } t_r = t_l \\ -\frac{1}{2} - \epsilon + v_r(t_r, t_l), & \text{if } t_r > t_l \end{cases}$$

Then, by continuity of $v_p(t_p, t_{-p})$ for all t_p, t_{-p} and $\forall p \in \{l, r\}$, it is clear that $\sum_p V_p(\boldsymbol{t}) = -1 + \sum_p v_p(\boldsymbol{t})$ is continuous in $\boldsymbol{t}$ on $\mathcal{T}$. As a result, condition (i) is trivially satisfied. For diagonal payoff security in mixed strategies we need to show that:

$\forall p, \forall \varepsilon > 0, \forall \boldsymbol{\sigma} \in \boldsymbol{\Sigma}$, $\exists\ \hat{\sigma}_p \in \Sigma_p$ s.t. $V_p(\hat{\sigma}_p, \sigma'_{-p}) \geq V_p(\boldsymbol{\sigma}) - \varepsilon$, $\forall \sigma'_{-p}$ in some open neighborhood of σ_{-p}.

Clearly, this is always true. To see this pick any profile $\boldsymbol{\sigma} = (\sigma_l, \sigma_r)$ such that $\sigma_l = \sigma_r$ and consider party r playing strategy $\hat{\sigma}_r$ that assigns larger probability to $t_r = 0$ such that $\hat{\sigma}_r(t_r = 0) > \sigma_r(t_r = 0)$. Then, for small perturbations of σ'_l, close enough to σ_l, the condition is always satisfied since there is at most a small loss in expected vote share that can be offset by a positive change in the expected outcome. As a result, since both conditions are satisfied we conclude that mixed extension game $\bar{G}$ is better-reply secure. Hence, $\forall \epsilon < \hat{\epsilon}$ the reduced game G possesses a symmetric Nash equilibrium in mixed strategies

$$\boldsymbol{\sigma}^*(\boldsymbol{t}) = (\sigma_l^*(t_l) = \sigma_r^*(t_r); \sigma_L^*(t_L) = \sigma_R^*(t_R)),$$

such that σ_l^* and σ_r^* have finite support on $[0, \tau]$ with $E[\sigma_l^*(t_l)] = E[\sigma_r^*(t_r)] = \check{\tau}_\epsilon < \tau$, whereas σ_L^*, σ_R^* are the degenerate strategies with $\sigma_L^*(\tau) = \sigma_R^*(\tau) = 1$. This completes the proof. ■

B.5 Correlated Dimensions of Electoral Competition: The Non-Symmetric Case

So far in the model, we have assumed that parties' positions are fixed over the ideology dimension (left-right) whereas on the economic policy (redistribution) dimension a strategic choice t_p is made. Nevertheless, the two dimensions might be correlated. It might be the case that political parties (or voters) have preferences over redistribution that are part of their ideological identity. That is they are not elements of strategic choice, rather they are also given. For example, it is commonly believed that left and centre-left parties have higher preference for taxation and consequently, for redistribution. Yet, as we will argue shortly, as long as parties' heterogeneous preferences over redistribution are an intrinsic part of their identity and are invariant our comparative static results will remain qualitatively unchanged despite the fact that our equilibrium characterization will change.

To see this, consider that left parties have stronger preference for redistribution than the right ones[11]. Then their strategic choice $t_p \in [0, \tau]$ can be viewed as the top-up amount of redistribution promised (or not) in the heat of electoral competition in order to score opportunistic electoral gains. As a result, unemployed voters might be more inclined to vote for left parties while the opposite will be true for the employed ones. If we were to incorporate this ideology-determined, and thus fixed, desire of the parties for redistribution to their identity it would have been equivalent to assuming that the distributions of the employed and unemployed voters are not uniform in the $[0, 1]$ interval. Rather, the mass of unemployed voters in the $[0, 1/2]$ is larger than that in $[1/2, 1]$, the opposite being true for the employed. Then, depending

[11] Assume that apart from the strategic choice $t_p \in [0, \tau]$ that each party is making prior to the elections, there is a component $\bar{\alpha}_L$ or $\bar{\alpha}_R$ that measures partisan preferences over redistribution (e.g. $\bar{\alpha}_L > \bar{\alpha}_R$) and depends on their ideological identity which is fixed. As a result, this extra component does not vary and we have $t_p \in [\bar{\alpha}_p, \tau + \bar{\alpha}_p]$, $\tau > 0$.

on the shape of the two distributions one of the two moderate parties would have an advantage compared to the symmetric case. This will induce a non-symmetric equilibrium outcome. Nevertheless, this will not affect the strategic behavior of the parties. It will still be a strictly dominant strategy for both moderate parties to promise more "top-up" redistribution in order to increase their vote shares (Lemmata 1 and 2). Similarly, the two extremist parties will face the same dilemma as before: how many votes will they be willing to sacrifice in order to strategically manipulate the outcome by boosting the chances of electoral success of their sister-party? The trade-off faced will be the same in nature. Yet, this time it will not be symmetric. As a result, just as we have shown for the case of $\epsilon < \hat{\epsilon}$, there will be *no pure-strategy* equilibrium of the game. Rather, we will have a *non-symmetric* equilibrium in *mixed strategies* which will involve the two moderate parties proposing "top-up" tax rate τ, while the two extremists will play a mixed strategy which in expectation will be strictly less than τ (although non-symmetric). As a result, our comparative statics analysis, even in this non-symmetric case, could go through as before.

B.6 Robustness of Institutional Set-Up: Electoral Rules and Coalitions

So far in the analysis we have assumed that the party that wins most votes implements its platform (social policy and redistribution). That is, we have implicitly assumed simple plurality (or the FPTP rule) and as a result, we have implicitly excluded the possibility of coalition government formation. We have only briefly mentioned that our equilibrium characterization and comparative statics results do not depend on the institutional architecture (electoral rule and coalition governments) because the incentives for strategic behavior and the trade-off between votes

and policy outcomes that the extreme parties face is also present in this different institutional set-up. In this section we address those issues directly by examining what happens when we introduce the *proportional rule* which, in turn, allows for coalition governments. Before presenting the result, we need to comment that we restrict attention only on the equilibrium of Proposition 4. We shall not worry with issues of uniqueness of equilibrium here since the aim is to demonstrate that the equilibrium we have characterized in Proposition 1 can arise even if we vary the institutional set-up. Then, our comparative statics predictions, derived from that equilibrium, can still carry forward despite altering the electoral rule. To fix ideas further, we make some assumptions on the institutions and the process of coalition formation.

Assumption 1 If no party wins the absolute majority (that is if $v_p < 1/2$ for all $p \in \mathcal{P}$) a coalition of parties $C \subset \mathcal{P}$ is formed such that $\sum_{p \in C} v_p \geq \frac{1}{2}$ and the policy implemented is the weighted average of their most preferred policies. That is, $\omega(C) \equiv \frac{\sum_{p \in \mathcal{C}} (v_p * p)}{\sum_{p \in C} v_p}$, for $p \in \{l, L, A, a\} \subseteq [0, 1]$.

The first assumption is straightforward and very common in the literature of coalition formation.

Assumption 2 The formateur $\hat{p}$(the party with most votes such that $v_{\hat{p}} > v_{-\hat{p}}$) will always have to participate and lead the coalition C.

Assumption 3 Let $\mathcal{C}$ be the set of all possible coalitions C that satisfy the above conditions. Then the formateur will form the minimum winning coalition such that $C \in \mathcal{C}$ and the distance $d(\hat{p}, \omega(C))$ is minimized for ω, $\hat{p} \in [0, 1]$.

The last two assumptions are also fairly intuitive. As it is common in almost all real life examples, the winner becomes the formateur and is responsible of forming a coalition. Also since in our model parties care not only about winning or being part of a coalition but they are also policy motivated, it is normal to assume that they

care about the policy outcome that each potential coalition will implement. Hence, the formateur will strictly prefer to form the coalition that minimizes the distance between its ideal point and the policy of the coalition. This means that its most likely coalition partners are its spatial neighbors (in the social policy dimension). Lastly, note that we have implicitly assumed that the electoral rule is some form of proportional representation system. Finally, we want to restrict attention to *stable* coalitions (Troubounis and Xefteris 2012). Formally:

Definition 9 *A coalition $C \in \mathcal{C}$ is stable iff $\nexists$ a coalition $C' \in \mathcal{C}$, satisfying A.1-A.3 such that $p \notin C$ but $p \in C'$ and $d(p, \omega(C')) < d(p, \omega(C))$.*

This definition basically says that for a coalition to be stable a party which is left out of the coalition cannot have a profitable deviation such that it makes it profitable for the formateur to form a new coalition that includes the deviating party. After providing this definition we can now state and prove the result.

Proposition 10 *Let Assumptions 1-3 hold. Also let conditions of Proposition 1 hold (that is $\epsilon > \hat{\epsilon}$). Then, the following vector $\boldsymbol{t}^* = (t_l^*, t_L^*, t_R^*, t_r^*) = (0, \tau, \tau, 0)$ constitutes a Nash equilibrium of the electoral game and induces the following **stable** coalition $C^* = \{L, A\}$ with policy outcome: $\omega(\boldsymbol{v}(\boldsymbol{t}^*)) = 1/2$ (median).*

Proof. First note that the vector $\boldsymbol{t}^*$ can induce a coalition that satisfies Assumptions 1 to 3. Clearly, as we have shown in Proposition 1 the resulting vote share allocation $\boldsymbol{v}(\boldsymbol{t}^*)$ is such that the two centrist parties L and A share the same amount of votes and tie in the first place ($v_L = v_A = 1/4 + \epsilon/2 + 1/2[z(q, \tau)]$). Then the two parties are both the formateurs and join a coalition between themselves. Clearly, their vote share is more than $1/2$ and hence, there is no need to include any other party (even if including another party was not ruled out by assumption it would still make no sense

for parties L and A to include an extremist since it would cause $\omega(C)$ to deteriorate for at least one of them). The outcome of such a balanced coalition is obviously to implement the median policy (1/2).We need now show two things. First, that this allocation is indeed a NE. Second, that the resulting coalition C^* is indeed stable.

First consider deviations by parties L and A (by symmetry we need only examine L). Clearly, there is no profitable deviation for L. Any $t'_L \neq t^*_L$ will cause it to lose votes and cease being a formateur (not a winner any longer). So it will either end up in the same coalition with less influence over the outcome, or even worse another coalition will be formed excluding it. In both cases this implies strictly lower utility (less votes and worse outcome in expected terms).

W.l.o.g. consider an extremist party (say l) and its incentives to deviate from $t^*_l = 0$. Any $t'_l > 0$ will increase its vote share but it will deprive (as we have shown in the proof of Proposition 1) party L from some votes. Also note that the allocation of votes between parties A and a will remain unchanged. As a result, party A is the sure winner (yet not with absolute majority) and becomes the *unique formateur*. Clearly, the only coalition that satisfy Assumptions 2 and 3 is $C' = \{A, a\}$ (recall that we are assuming throughout $\epsilon > \hat{\epsilon}$). As a result, deviating from t^*_l to t'_l cannot cause party l to enter a more favorable coalition. In fact, it gives rise to a strictly worse one (expected policy outcome of new coalition is to the right of the median and hence, further away from 0). To show that this deviation is not profitable we have to compare the maximum gain in utility from deviating (vote gain) with the loss of inducing a strictly worse outcome. From Proposition 4 we have:

$$\max\{v_l^{gain}(t'_l = \tau)\} = 1/2[z(q, \tau)]$$

Then, the deviation is *not* profitable if and only if the following is satisfied:

$$z(q,\tau)/2 < d(p_l = 0, \omega(C')) - d(p_l = 0, \omega(C^*)) \iff$$

$$1/2[z(q,\tau)] < d(p_l = 0, \omega(C')) - \underbrace{1/2}_{d(0,\omega(C^*))} \iff$$

$$z(q,\tau)/2 < \underbrace{3/4 - z(q,\tau)/2 + \epsilon^2 + \epsilon z(q,\tau)}_{d(0,\omega(C'))} - 1/2 \iff z(q,\tau) < 1/4 + \epsilon^2 + \epsilon z(q,\tau)$$

which is always satisfied for every $\epsilon > \hat{\epsilon}$ since $z(\bullet)$ is bounded away from $1/4$ and $\hat{\epsilon} \equiv 1/2\{\max z(\cdot)\} > 0$. Hence, the deviation is never profitable. Hence, $\boldsymbol{t}^*$ is a NE. Since the equilibrium induces a stable coalition (as we have argued no extremist party can unilaterally induce a better coalition) this completes the proof. ■

Remarks

Two brief comment with respect to the equilibrium characterization of Proposition 10 are now in order. Firstly, we note that this equilibrium need not be *unique*. In fact, non uniqueness is not a problem in the following sense: the purpose of this section is to demonstrate that our desired equilibrium properties, that we later employ in our comparative statics analysis, are *robust* to alterations of the institutional architecture (from plurality to proportionality and coalitions). Since our purpose is to show that our equilibrium characterization, where moderate parties always propose more redistribution than the extreme ones, and the resulting comparative static analysis do *not* depend on the choice of particular electoral institutions, it suffices to show that: i) an equilibrium with those characteristics exist under proportionality and ii) that such an equilibrium is stable, in the sense of Definition 9. And that is exactly what we have shown in Proposition 5. Issues related with the full characterization

of the complete set of NE for every possible institutional arrangement (and coalition formation process) are beyond the scope of our analysis. Hence, we defer them for future work.

Secondly, the reason that those alterations in the institutional architecture do not affect equilibrium characterization is that main drivers of our result remain intact: the trade-off between getting more votes (office motivation) and altering the policy outcome (policy motivation) and the strategic behavior on the part of extreme parties that this trade-off induces. Much like in the standard case, extreme parties would be again shooting themselves on the foot (by causing a disfavored change in the policy outcome) if they over-compete with moderate parties on the economic (redistribution) dimension. Hence, extreme parties, once more, act strategically in order to manipulate the policy outcome and bring it closer to their ideal point (by attempting to alter the winning coalition). In fact, in this case this strategic behavior of extreme parties can have an extra justification: it is not only policy motivations (to alter the policy outcome by causing a more favorable to them coalition to occur) but also office motivations (they can themselves participate in government via the coalition) that drive their strategic behavior. Consequently, the trade-off and our point is strengthened further.

B.6.1 Other Proofs

Proof of Lemma 3. Continuity and differentiability of $z(\bullet)$ are derived straightforward from the assumed properties of $f(\bullet)$. Then, for (i) consider the function $z(q, \hat{t}_p)$ and define:

$$\Delta^m f(\bullet) \equiv f(\hat{m} + \delta\hat{t}_p) - f(\hat{m}) \text{ and } \Delta^M f(\bullet) \equiv f(\hat{M}) - f(\hat{M} - \gamma\hat{t}_p).$$

Then, $z(\bullet)$ takes the following form:

$$z(\bullet) = q\Delta^m f(\bullet) - (1-q)\Delta^M f(\bullet)$$

Taking a first-order Taylor expansion we have:

$\Delta^m f(\bullet) \equiv f(\hat{m} + \delta\hat{t}_p) - f(\hat{m}) = \delta\hat{t}_p f'(\hat{m})$ and $\Delta^M f(\bullet) \equiv f(\hat{M}) - f(\hat{M} - \gamma\hat{t}_p) = \gamma\hat{t}_p f'(\hat{M} - \gamma\hat{t}_p)$.

We need only show that for every concave $f(\bullet)$ the following is true:

$$q\Delta^m f(\bullet) > (1-q)\Delta^M f(\bullet) \iff q\delta\hat{t}_p f'(\hat{m}) > (1-q)\gamma\hat{t}_p f'(\hat{M} - \gamma\hat{t}_p) \implies$$

$f'(\hat{m}) > f'(\hat{M} - \gamma\hat{t}_p)$, since $q\delta = q(1-q)(M-m) = \gamma(1-q)$.

For any concave $f(\bullet)$ this implies: $\hat{m} < \hat{M} - \gamma\hat{t}_p \implies$

$$\overbrace{m + \underbrace{(1-q)(M-m)}_{\delta} t_{-p}}^{\hat{m}} < \overbrace{M - \underbrace{q(M-m)}_{\gamma} t_{-p}}^{\hat{M}} - \underbrace{q(M-m)}_{\gamma}\underbrace{(t_p - t_{-p})}_{\hat{t}_p} \implies$$

$$(M-m)[(1-q)t_{-p} + qt_p] < M - m \implies (1-q)t_{-p} + qt_p < 1$$

which is always true $\forall q, t_p, t_{-p} \in (0,1)$. Hence, $z(\bullet)$ is always positive.

For (ii) we first compute:

$\partial z(\cdot, \hat{t}_p)/\partial t_p = qf'(\hat{m} + \delta\hat{t}_p)\delta - (1-q)f'(\hat{M} - \gamma\hat{t}_p)\gamma$.[12]

Now, we need only show that $\partial z(\cdot, \hat{t}_p)/\partial t_p > 0$. But, observe that:

$$\partial z(\cdot, \hat{t}_p)/\partial t_p > 0 \text{ iff } q\delta\left[f'(\hat{m} + \delta\hat{t}_p) - f'(\hat{M} - \gamma\hat{t}_p)\right] > 0 \iff$$

$$f'(\hat{m} + \delta\hat{t}_p) > f'(\hat{M} - \gamma\hat{t}_p) \iff \hat{m} + \delta\hat{t}_p < \hat{M} - \gamma\hat{t}_p \iff$$

$$\underbrace{m + \delta t_{-p}}_{\hat{m}} + \delta\underbrace{(t_p - t_{-p})}_{\hat{t}_p} < \underbrace{M - \gamma t_{-p}}_{\hat{M}} - \gamma\underbrace{(t_p - t_{-p})}_{\hat{t}_p} \iff (\delta+\gamma)t_p < M - m \iff$$

$(M-m)t_p < M - m$ which is always true for all $t_p \in (0,1)$. This completes the proof. ■

Proof of Proposition 4. In order to show that the proposed equilibrium is indeed a symmetric NE, we need to show that no party has an incentive to deviate unilaterally from its equilibrium strategy, that is:

$\forall p \in \mathcal{P}$, $V_p(t_p^*, t_{-p}^*) > V_p(t_p', t_{-p}^*)$, $\forall\ t_p'$, t_{-p}^*.

First, we calculate the vote share $v_p(t_p, t_{-p})$ that each party receives as a function of its strategy (tax rate proposal) t_p, for every $t_p, t_{-p} \in [0, \tau]$. To do so, we have to identify the voter who is indifferent between voting for party a or A, A or L and L or l respectively. Then, we can compute the vote share for each party. We begin by identifying the indifferent voter between parties a and A[13]. Formally, the following

[12] Note that $\hat{m}$ and $\hat{M}$ do **not** depend on t_p, whereas $\hat{t}$ is a linear function of t_p.

[13] We need only examine the case where $x \in [\epsilon, \frac{1}{2}]$, since by single-peakedness and the fact that in equilibrium party r offers $t_r^* = 0$, any voters to the left of ϵ will never face the dillemma between L and r for that matter.

equality must hold for an unemployed voter ($y = m$):

$$U_{y,x}(1, t_r) = U_{y,x}(1/2 + \epsilon, t_A) \implies -|1 - x| + f(m + T(t_a)) = -|1/2 + \epsilon - x| + f(m + T(t_A)) \iff$$

$$-(1-x)+f(m+(1-q)(M-m)t_a) = -(x-1/2-\epsilon)+f(m+(1-q)(M-m)t_A) \iff$$

$$x = \tfrac{3}{4} + \tfrac{\epsilon}{2} + \tfrac{1}{2}\left[f(m + \delta t_A) - f(m + \delta t_a)\right] = \tfrac{3}{4} + \tfrac{\epsilon}{2} + \tfrac{1}{2}\left[f(\hat{m} + \delta \hat{t}_A) - f(\hat{m})\right]^{14}$$

By analogy, for an employed voter ($y = M$) the condition becomes:

$$x = \tfrac{3}{4} + \tfrac{\epsilon}{2} - \tfrac{1}{2}\left[f(M - \gamma t_a) - f(M - \gamma t_A)\right] = \tfrac{3}{4} + \tfrac{\epsilon}{2} - \tfrac{1}{2}\left[f(\hat{M}) - f(\hat{M} - \gamma \hat{t}_A)\right]$$

Given that a fraction q of the electorate has $y = m$ and the remaining $1 - q$ has $y = M$, and given that the two continua of voters are identical in all other respects, we can then compute the *"aggregate"* indifferent voter:

$$x = \tfrac{3}{4} + \tfrac{\epsilon}{2} + \tfrac{1}{2}\left\{q\left[f(\hat{m} + \delta \hat{t}_A) - f(\hat{m})\right] - (1 - q)\left[f(\hat{M}) - f(\hat{M} - \gamma \hat{t}_A)\right]\right\} = \tfrac{3}{4} + \tfrac{\epsilon}{2} + \tfrac{1}{2}[z(q, \hat{t}_A)]$$

Then, all voters to the right of x will vote for party a whereas all voters to the left of x (and till voter ϵ) will voter for party A. By a symmetric argument a similar analysis applies when we compare the indifferent voter between parties L and l.

We now repeat the same exercise for parties A and L[15]. In a symmetric equilib-

[14] Here, w.l.o.g. let $t_p = t_A$ and $t_{-p} = t_a$.

[15] We focus on the voters on the interval $[1/2 - \epsilon, 1/2 + \epsilon]$ since the other voters are not relevant for this comparison.

rium by definition $t_L = t_A$. Hence, the following equality must hold:

$$U_{y,x}(t_L) = U_{y,x}(t_A) \implies -|1/2-\epsilon-x|+f(y+T(t_L)) = -|1/2+\epsilon-x|+f(y+T(t_A))$$

Since $T(t_L) = T(t_A)$, we have that $f(y + T(t_L)) = f(y + T(t_A))$ for every $y \in \{m, M\}$.Hence, we conclude that the indifferent voter is the median ($x = 1/2$). Then, we can compute the (symmetric) vote share allocation for each party as a function of its strategy choice (by symmetry it suffices to do so for parties A and a):

$$v_A(t_A) = \tfrac{1}{4} + \tfrac{\epsilon}{2} + \tfrac{1}{2}\left\{q\left[f(\hat{m} + \delta\hat{t}_A) - f(\hat{m})\right] - (1-q)\left[f(\hat{M}) - f(\hat{M} - \gamma\hat{t}_A)\right]\right\} =$$

$$= \tfrac{1}{4} + \tfrac{\epsilon}{2} + \tfrac{1}{2}[z(q, \hat{t}_A)] \text{ and by analogy}$$

$$v_a(t_a) = \tfrac{1}{4} - \tfrac{\epsilon}{2} + \tfrac{1}{2}[z(q, \hat{t}_a)] = \tfrac{1}{4} - \tfrac{\epsilon}{2} - \tfrac{1}{2}[z(q, \hat{t}_A)]^{16}$$

Then observe that: $\frac{\partial v_R}{\partial t_R} = \frac{1}{2}\left[\frac{\partial z(\cdot,\hat{t}_R)}{\partial t_R}\right]$ and $\frac{\partial v_r}{\partial t_r} = \frac{1}{2}\left[\frac{\partial z(\cdot,\hat{t}_r)}{\partial t_r}\right]$

Clearly, we have that $\frac{\partial v_p}{\partial t_p} > 0$ *iff* $\partial z(\cdot, \hat{t}_p)/\partial t_p > 0$, which by Lemma 1 is always true $\forall q, m$ and all $t_p \in [0, \tau]$ such that $\tau \in (0, 1)$. Hence, the vote share v_p for *every* party $p \in \mathcal{P}$ is *strictly increasing* in t_p. Before proving the main result, we first prove a useful Lemma.

Lemma 11 *For all $\epsilon > 0$ and every t_{-A} (and t_{-L} respectively), strategy $t_A = \tau$ (and $t_L = \tau$ respectively) is strictly dominant for party R (and L respectively).*

[16]Note that if we instead define $\hat{t}_a \equiv t_a - t_A$ we then have $z(q, \hat{t}_a) = -z(q, \hat{t}_A)$ and Lemma 1 applies again.

Proof of Lemma 11. The proof follows three steps. The *first step* is to show that vote shares are increasing in tax rates, that is $\partial v_p/\partial t_p > 0$ for $p \in \{L, A\}$. This was already shown above. The *second step* is to show whenever a centrist party (either L or A) chooses $t_{L,A} = \tau$ then the two extremists (l and a) can *never win*. To prove this statement, w.l.o.g. fix $t_A = \tau$ and compute the minimum vote share that party A can get when choosing $t_A = \tau$. Then we compare it against the maximum vote share that party l can get for any t_l. We will show that $v_A^{\min}(t_A = \tau; t_{-A}) > v_l^{\max}(t_l, t_{-l})$ for any t_{-A} and every t_l, t_{-l}.

$$v_A^{\min}(t_A = \tau; t_{-A} = \tau) = \tfrac{1}{4} + \tfrac{\epsilon}{2}{}^{17} \text{ and } v_l^{\max}(t_l = \tau, t_{-l}) < \tfrac{1}{4} + \tfrac{\epsilon}{2}{}^{18} \implies v_A^{\min} > v_l^{\max}$$

A directly analogous argument can be constructed for parties L and a. As a result, the two extremist parties can never win when $t_{A,L} = \tau$. Hence, either party A is the sure winner or party L, or they both win with probability 1/2. *Step three* entails an exhaustive case by case analysis when either A or L choose $t_{L,A} < \tau$. By symmetry, we only work with party A. Let $t_A < \tau$. Then, consider the following cases.

Case 1: Party A is the sure winner. Then, switching to $t_A = \tau$ results in an increase in its utility (same outcome but more votes, since by Step 1 we have shown that $\partial v_p/\partial t_p > 0$ for $p \in \{L, A\}$)

Case 2: Party L is the sure winner. Then, switching to $t_A = \tau$ results in an

[17] Since all parties propose the same tax rate τ, the economic dimension is cancelled out and only the ideology dimension matters.

[18] The strict inequality follows from the following: consider the case that party L vanishes. Since we have fixed $t_A = \tau$ and $v_l^{\max}$ implies $t_l = \tau$, the economic dimension is cancelled-out and parties A and l will split the votes in the interval $[0, \frac{1}{2} + \epsilon]$ (the indifferent voter is the equidistant voter $x^{ind} = 1/4 + \epsilon/2$). Hence, at most $v_l^{\max} = 1/4 + \epsilon/2$. But notice that even if L plays $t_L = 0$ against $t_R = t_l = \tau$, $v_L = 1/4 + \epsilon/2 - z(q, \hat{t}_l = \tau)/2 - z(q, \hat{t}_A = \tau)/2 = 1/4 + \epsilon/2 - z(q, \tau)$. But we know that $z(q, \tau) \leq 1/4$ (bounded above). Hence, $v_L \geq \epsilon/2 \neq 0$. Thus, $v_l^{\max} < 1/4 + \epsilon/2$.

increase in its utility (more votes by Step 1 and same or better outcome, since by Step 2 the only possible outcomes are: either party A is the sure winner or party L, or they both win with probability 1/2).

Case 3: Parties A and L tie in first place. Then, switching to $t_A = \tau$ results in an increase in its utility (more votes by Step 1 and *strictly* better outcome, since now by Step 2, A *must* be the sure winner).

Case 4: An extremist party (either l or a) is the sure winner. Then, switching to $t_A = \tau$ causes A to win with *certainty* (by Step 2 that is the only possible outcome out of the three since for an extremist to win in the first place we *must* have had that both $t_{L,A} < \tau$). Hence, this results in an increase in its utility (more votes by Step 1 and *strictly* better outcome).

Case 5: The two extremists (l and a) tie in first place. This implies that party L offers a t_L that is *strictly less* than t_l. Then, switching to $t_A = \tau$ causes A to be the *sure winner* (since by Step 2 that is the only possible outcome). Hence, this results in more utility for party A (more votes by Step 1 and better outcome).

Case 6: There is a tie between a centrist (L or A) and an extremist (l or a) party. There are 4 sub-cases: i) $\{A, a\}$; ii) $\{A, l\}$; iii) $\{L, a\}$ and iv) $\{L, l\}$. Then, switching to $t_A = \tau$ results in an increase in its utility. In all sub-cases A gets more votes by Step 1 and at the same time it wins by Step 2 (better outcome). To verify this recall that for L to tie with l (or a) it implies that $t_L < \tau$, hence switching to $t_A = \tau$ causes A to win with *certainty*.

Case 7: There is a tie among any *three* parties. If A is among the winners, then, switching to $t_A = \tau$ results in more utility (more votes by Step 1 and better outcome, *sure winner* by Step 2). If A is *not* among the winners, then $t_A = \tau$ results in more utility (more votes and better outcome in expected terms) since it wins with *certainty* (recall that by Step 2 a tie between L and one or more extremists implies

that $t_L < \tau$).

Case 8: *All* four parties tie. Then, switching to $t_A = \tau$ causes A to win with *certainty* (Step 1). So, it increases its utility (more votes and better outcome).

Hence, we conclude that strategy $t_{A,L} = \tau$ is *strictly dominant* for parties A and L. This completes the proof of Lemma 2. ■

Then, by Lemma 11 we can iteratively eliminate all other strategies for the two moderate parties and conclude that in equilibrium it must be the case that both A and L play $t_L^* = t_A^* = \tau$. But then, the two extremist parties can never win in equilibrium. As a result they face a constrained vote maximization program. Taking $t_L^* = t_A^* = \tau$ as given, assume for a moment that since $\frac{\partial v_p}{\partial t_p} > 0$ they also choose $t_r' = t_l' = \tau$. By Lemma 11, in equilibrium, parties L and A tie in first place. Then, any of the extremist parties (say a) has an *incentive to undercut* l (that is to propose $t_a'' < t_a' = t_l' = \tau$) and cause party A to win with certainty *iff*:

$$\underbrace{\epsilon}_{\text{Gain from causing a shift in policy outcome}} \geq \underbrace{v_a(t_a' = \tau) - v_r(t_a'' < \tau)}_{\text{Loss of votes due to deviation from } t_a' \text{ to } t_a''}$$

But given $t_A^* = t_L^* = \tau$, we know that $\forall t_a, t_{-a}$ the maximum loss in votes is equal to the following expression:

$$\max\{v_a(t_a' = \tau) - v_a(t_a'' = 0)\} = 1/4 - \epsilon/2 - \left[1/4 - \epsilon/2 + \tfrac{z(q,\hat{t}_a)}{2}\right] = -\tfrac{1}{2}z(q,\hat{t}_a) = \tfrac{1}{2}z(q,\hat{t}_A) = \tfrac{1}{2}z(q,\tau)^{19},$$

But then, notice that we have defined $\hat{\epsilon} \equiv \frac{1}{2}\max_{q,\tau}\{z(q,\tau)\} < \frac{1}{8}$[20], which in turn

[19] Recall that $\hat{t}_r = t_r'' - t_R^* = -\tau$ and $\hat{t}_R = t_R^* - t_r'' = \tau$. Hence, the last two equalities follow.

[20] By Lemma 1 we have shown that $z(\cdot)$ is a positive and continuous function. It can be checked

implies that $\exists\, \hat{\epsilon} \in (0, 1/2)$ such that for every $\epsilon > \hat{\epsilon}$ undercutting is *always* profitable. That is, the constraint is *always* satisfied with *strict* inequality. Formally, this means that:

$$\epsilon > \max\{v_a(t'_a = \tau) - v_a(t''_a = 0)\} = \tfrac{1}{2} \max_{q,\tau}\{z(q,\tau)\} \equiv \hat{\epsilon}$$

Since by symmetry, undercutting is always profitable for party l as well, we conclude that in equilibrium we must have $t^*_a = t^*_l = \min\{t \mid t \in [0, \tau]\} = 0$. Hence we conclude that for every $\epsilon > \hat{\epsilon}$ the *unique* Nash equilibrium strategy profile is $\boldsymbol{t}^* = (t^*_l, t^*_L, t^*_A, t^*_a) = (0, \tau, \tau, 0)$. This completes the proof. ■

Proof of Proposition 5. Recall that we have computed:

$$F(q,\tau) = 1 - 2C - z(q,\tau)\,[z(q,\tau) + 2\epsilon].$$

Then, we compute:

$$\tfrac{\partial F(q,.)}{\partial q} = \tfrac{\partial F}{\partial z(.)} \tfrac{\partial z(.)}{\partial q} = -2[z(q,\tau) + \epsilon] \tfrac{\partial z(.)}{\partial q}$$

We have shown (Lemma 3) that $z(q,\cdot)$ is a positive, continuous and differentiable function in $[0,1]$. Next, we need to show that $z(q,\bullet)$ is also strictly concave in $(0,1)$ w.r.t. q. That is, $\tfrac{\partial^2 z(q,.)}{\partial q^2} < 0$ for all q and $\forall m, \tau \in (0,1)$. Note that in the case of Proposition 1, we have $\hat{t}_p = t^L - t^l = t^R - t^r = \tau$. Then, with some abuse of notation, we can rewrite $\delta(q)$ and $\gamma(q)$ as functions of q and $z(\cdot)$ becomes:

that the expression $z(q,\tau) \equiv q[f(m+\delta\tau) - f(m)] - (1-q)[f(M) - f(M-\gamma\tau)]$ obtains its maximum when $q = \frac{3}{4}$, $m = 0$ and $\tau = 1$. Hence, it is bounded above away from $1/4$.

$$z(q,\cdot) = q[f(m+\delta(q)\tau) - f(m)] - (1-q)[f(M) - f(M-\gamma(q)\tau)].$$

First note that $m + \delta(q)\tau < M - \gamma(q)\tau \implies$

$$m + (1-q)(M-m)\tau < M - q(M-m)\tau \implies (M-m)\tau < M - m$$

which is true for all $\tau \in (0,1)$. Then, we compute:

$$\frac{\partial^2 z(q,.)}{\partial q^2} = 2\left[f'(m+\delta(q)\tau)\left(\frac{\partial \delta(q)}{\partial q}\tau\right) + f'(M-\gamma(q)\tau)\left(\frac{\partial \gamma(q)}{\partial q}\tau\right)\right] +$$
$$q\left[f''(m+\delta(q)\tau)\left(\frac{\partial \delta(q)}{\partial q}\tau\right)^2\right] + (1-q)\left[f''(M-\gamma(q)\tau)\left(\frac{\partial \gamma(q)}{\partial q}\right)^2\right].$$

Observe that $\frac{\partial \delta(q)}{\partial q} = -\frac{\partial \gamma(q)}{\partial q}$. Hence, $\left(\frac{\partial \delta(q)}{\partial q}\right)^2 = \left(\frac{\partial \gamma(q)}{\partial q}\right)^2$. So we can write the above expression as follows:

$$\frac{\partial^2 z(q,.)}{\partial q^2} = 2\left(\frac{\partial \gamma(q)}{\partial q}\tau\right)[f'(M-\gamma(q)\tau) - f'(m+\delta(q)\tau)] + \left(\frac{\partial \gamma(q)}{\partial q}\tau\right)^2 [qf''(m+\delta(q)\tau) + (1-q)f''(M$$

We need to show that $\frac{\partial^2 z(q,.)}{\partial q^2} < 0$ for all $f(.)$ and $\forall q, m, \tau \in (0,1)$. Since $f''(.) < 0$ we have that:

$$\left(\frac{\partial \delta(q)}{\partial q}\right)^2 [qf''(m+\delta(q)\tau) + (1-q)f''(M-\gamma(q)\tau)] < 0.$$

Then, $\frac{\partial^2 z(q,.)}{\partial q^2} < 0$ iff $f'(M-\gamma(q)\tau) - f'(m+\delta(q)\tau) < 0 \iff$

$$f'(M-\gamma(q)\tau) < f'(m+\delta(q)\tau) \iff M - \gamma(q)\tau > m + \delta(q)\tau$$

which is always true. Hence, $z(q,\cdot)$ is concave w.r.t. q.

Since also $\epsilon > 0$, we have that $-2[z(q,.) + \epsilon] < 0$ for all $q \in (0,1)$ and $\forall$ $m, \tau \in (0,1)$. Then, we need only show that:

$\frac{\partial z(.)}{\partial q} > 0$ for all $q \in (0, \tilde{q})$ and $\forall$ $m, \tau \in (0,1)$, whereas $\frac{\partial z(.)}{\partial q} < 0$ for all $q \in (\tilde{q}, 1)$ and $\forall$ $m, \tau \in (0,1)$.

Since $z(q, \boldsymbol{.})$ is continuous on $[0,1]$ and strictly concave and differentiable on $(0,1)$ we can apply Rolle's version of the Mean Value Theorem. Observe that: $z(q=0) = 0$ and $z(q=1) = 0$. Then, by Rolle's Theorem we have that:

$\exists$ $\tilde{q} \in (0,1)$ such that $z'(\tilde{q}, \boldsymbol{.}) = 0$

But notice that $z'(\tilde{q}, \boldsymbol{.}) = 0$ also implies that $F'(\tilde{q}, .) = 0$. Moreover, by strict concavity of $z(q, \boldsymbol{.})$, we also have that $\tilde{q}$ is unique. Hence, we have that $\frac{\partial z(.)}{\partial q} > 0$ and consequently $\frac{\partial F(q,.)}{\partial q} < 0$ for all $q \in (0, \tilde{q})$, and $\frac{\partial z(.)}{\partial q} < 0$ and consequently $\frac{\partial F(q,.)}{\partial q} > 0$ for all $q \in (\tilde{q}, 1)$. That is, $F(q,.)$ is strictly decreasing for every $q < \tilde{q}$ and strictly increasing for every $q > \tilde{q}$. This completes the proof. ■

Proof of Corollary 6. Recall that we have computed:

$\frac{\partial F(q,.)}{\partial q} = \frac{\partial F}{\partial z(.)} \frac{\partial z(.)}{\partial q} = -2[z(q,\tau) + \epsilon] \frac{\partial z(.)}{\partial q}$

But then, observe that:

$\frac{\partial z(.)}{\partial q} = f(m + \delta(q)\tau) - f(m) + q f'(m + \delta(q)\tau) \left(\frac{\partial \delta(q)}{\partial q} \tau \right) + f(M) - f(M - \gamma(q)\tau) - (1-q) f'(M - \gamma(q)\tau) \left(\frac{\partial \gamma(q)}{\partial q} \tau \right)$

By a First-Order Taylor expansion we get:

$\frac{\partial z(.)}{\partial q} = \delta(q)\tau f'(m)+qf'(m+\delta(q)\tau)\left(\frac{\partial \delta(q)}{\partial q}\tau\right)+\gamma(q)\tau f'(M-\gamma(q)\tau)-(1-q)f'(M-\gamma(q)\tau)\left(\frac{\partial \gamma(q)}{\partial q}\tau\right)$

or[21]

$\frac{\partial z(.)}{\partial q} = \delta(q)\tau f'(m) - \gamma(q)\tau f'(m+\delta(q)\tau) + \gamma(q)\tau f'(M-\gamma(q)\tau) - \delta(q)\tau f'(M-\gamma(q)\tau) =$

$= \delta(q)\tau[f'(m) - f'(M-\gamma(q)\tau)] - \gamma(q)\tau[f'(m+\delta(q)\tau) - f'(M-\gamma(q)\tau)]$

Further note that $z'(\tilde{q})= 0$ in turn implies that:

$\delta(\tilde{q})[f'(m) - f'(M-\gamma(\tilde{q})\tau)] = \gamma(\tilde{q})[f'(m+\delta(\tilde{q})\tau) - f'(M-\gamma(\tilde{q})\tau)]$

But since $m < m+\delta(q)\tau < M-\gamma(q)\tau$ for all $q, m, \tau \in (0,1)$ we have that:

$f'(m) - f'(M-\gamma(\tilde{q})\tau) > f'(m+\delta(\tilde{q})\tau) - f'(M-\gamma(\tilde{q})\tau) > 0.$

As a result: $\frac{\delta(\tilde{q})}{\gamma(\tilde{q})} = \frac{1-\tilde{q}}{\tilde{q}} = \frac{f'(m+\delta(\tilde{q})\tau)-f'(M-\gamma(\tilde{q})\tau)}{f'(m)-f'(M-\gamma(\tilde{q})\tau)} \leq 1.$

Express the root $\tilde{q}$ that solves $z'(\tilde{q}, .) = 0$ as a function of m and τ, $\tilde{q}(m,\tau)$ such that $z'(\tilde{q}(m,\tau)) = 0$. Then, observe that the above expression implies that $\tilde{q} \geq \frac{1}{2}$. As m increases, observe that the ratio converges monotonically to 1. That is

$\lim_{m\to M} \frac{f'(m+\delta(\tilde{q})\tau)-f'(M-\gamma(\tilde{q})\tau)}{f'(m)-f'(M-\gamma(\tilde{q})\tau)} = 1.$

[21] Observe that $-\gamma(q) = q\frac{\partial \delta(q)}{\partial q}$ and $\delta(q) = (1-q)\frac{\partial \gamma(q)}{\partial q}$

Hence, $\tilde{q}(m,\tau) \to \frac{1}{2}$. As a result we have that $\frac{\partial \tilde{q}(m,\tau)}{\partial m} < 0$. Furthermore, as τ converges to 1 the numerator $f'(m+\delta(\tilde{q})\tau) - f'(M-\gamma(\tilde{q})\tau)$ monotonically converges to 0 and as a result so does the ratio. Hence, this implies that $\tilde{q}(m,\tau) \to 1$. That is, we have $\frac{\partial \tilde{q}(m,\tau)}{\partial \tau} > 0$. This completes the proof. ■

Proof of Proposition 7. We have to show that $\frac{\partial F(\tau,.)}{\partial \tau} < 0$. First, compute:

$$\frac{\partial F}{\partial \tau} = \frac{\partial F}{\partial z(.)} \frac{\partial z(.)}{\partial \tau} = -2[z(q,\tau)+\epsilon]\frac{\partial z(.)}{\partial \tau}.$$

Since we know that $-2[z(q,\tau)+\epsilon] < 0$ and by Lemma 1 we have shown that $\partial z(\cdot, \hat{t}_p)/\partial t_p > 0$, which implies $\partial z(\cdot,\tau)/\partial \tau > 0$[22] we conclude that $\frac{\partial F(\tau,.)}{\partial \tau} < 0$ for all $\tau \in (0,1)$ and every $q, m \in (0,1)$. This completes both parts of the proof. ■

[22]Recall that in equilibrium of Proposition 1 we had that $\hat{t}_p = t_p - t_{-p} = \tau$ and $t_p = \tau$ for $p \in \{L, R\}$.

B.7 Graphs and Figures

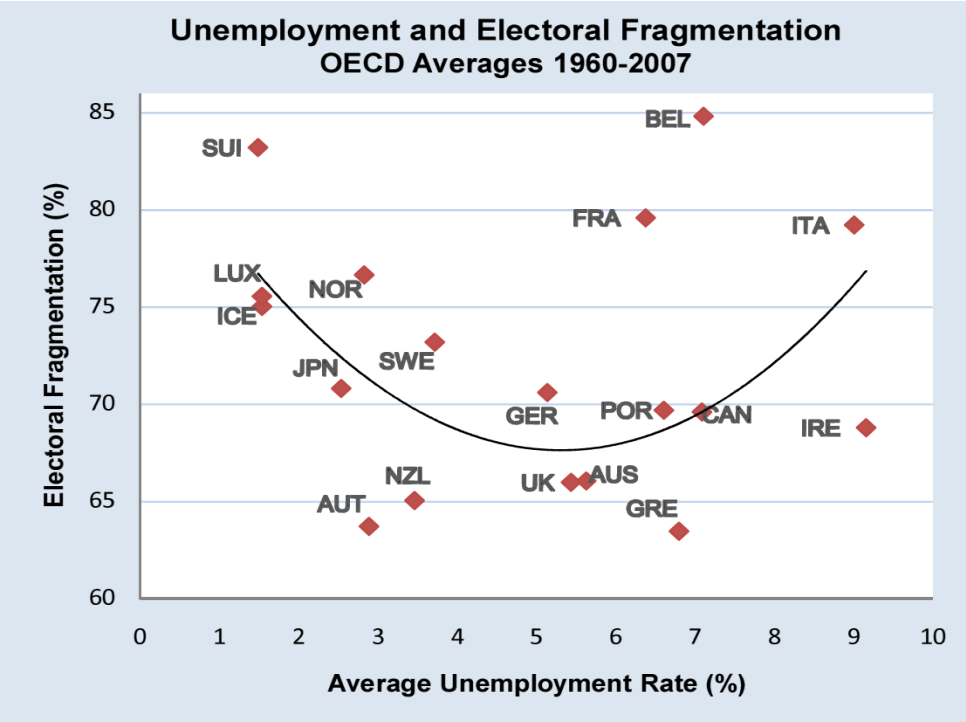


Fig. B.1: Electoral Fragmentation (Rae Index in %) and Unemployment Rates (%) in OECD Economies from 1960-2007 (national averages)

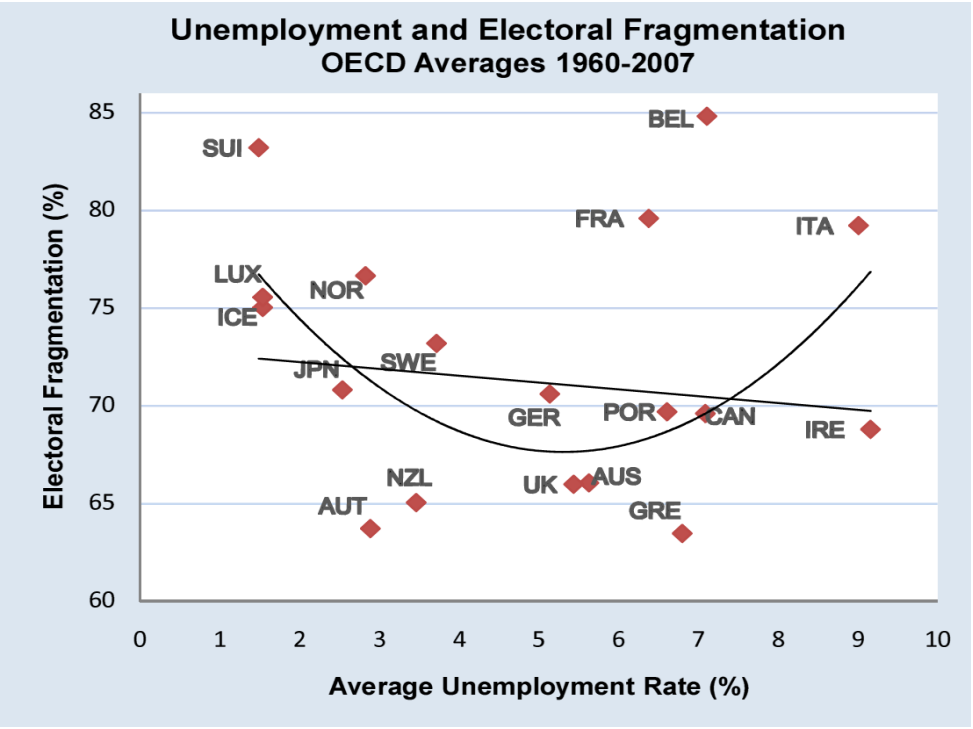


Fig. B.2: Electoral Fragmentation and Unemployment in OECD (1960-2007). Testing the linear hypothesis

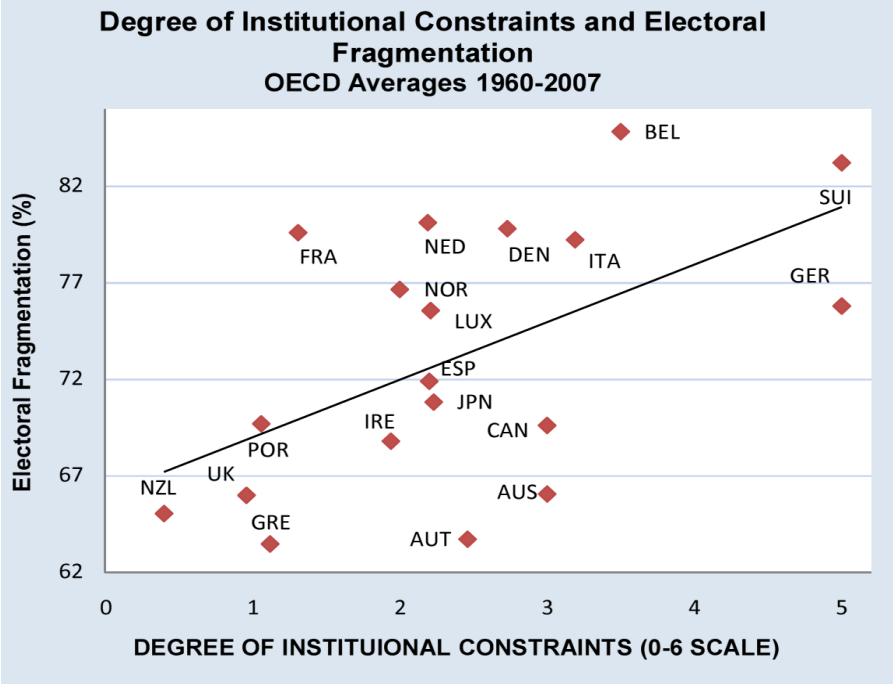


Fig. B.3.a: Institutional Constraints (e.g. fiscal, constitutional, political) and Electoral Fragmentation in OECD (1970-2007)

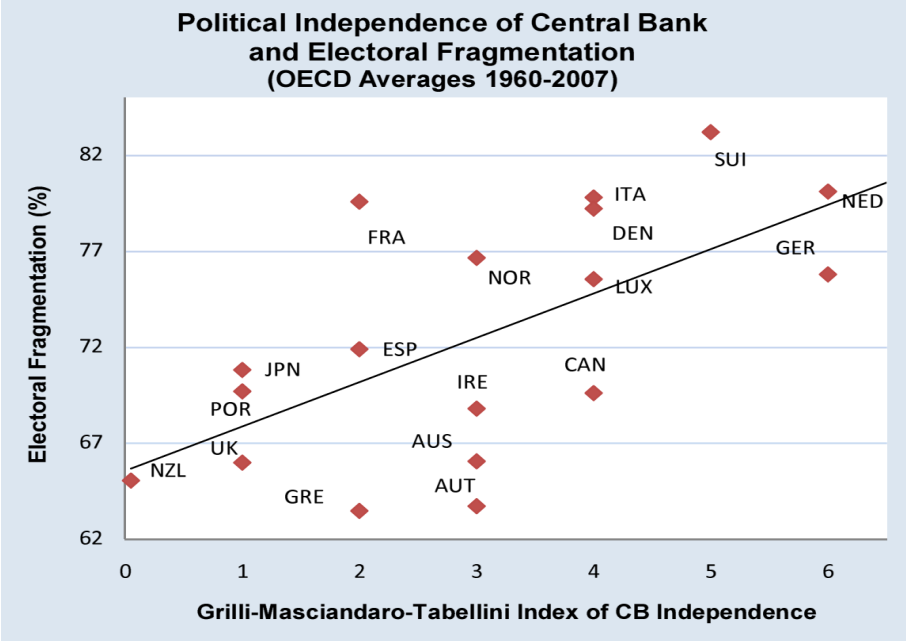


Fig. B.3.b: Political Independence of Central Banks and Electoral Frag--mentation in OECD (1970-2002)

Fig. B.4: Oil Price Shocks and Unemployment in the OECD (1960-2007): 1^{st}-stage relationship (

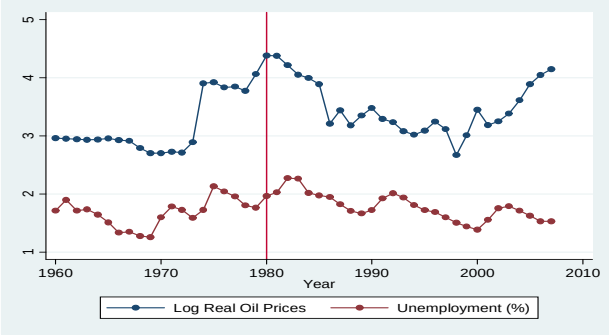


Fig.4.a: USA

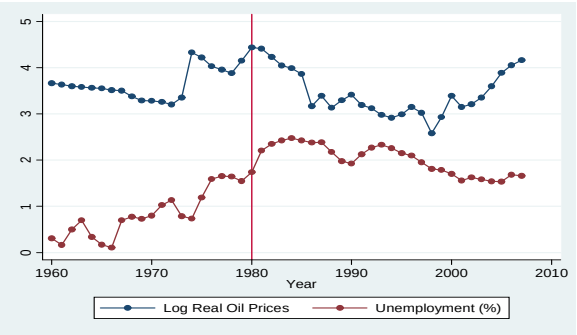


Fig.4.b: United Kingdom

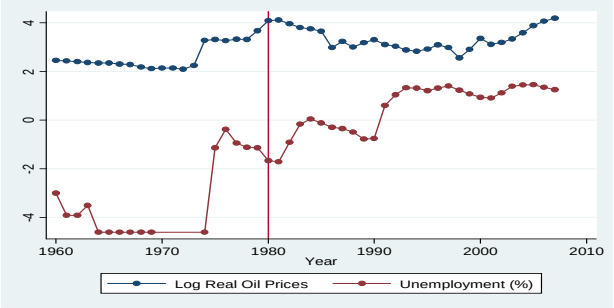


Fig. 4.c: Switzerland

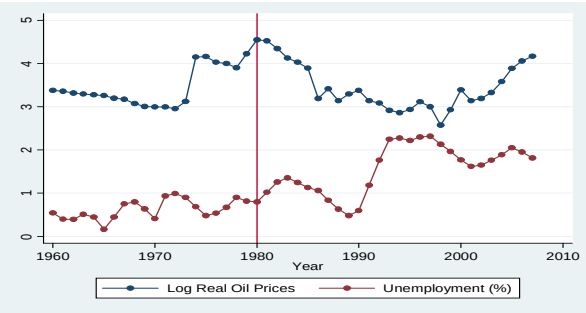


Fig. 4.d: Sweden

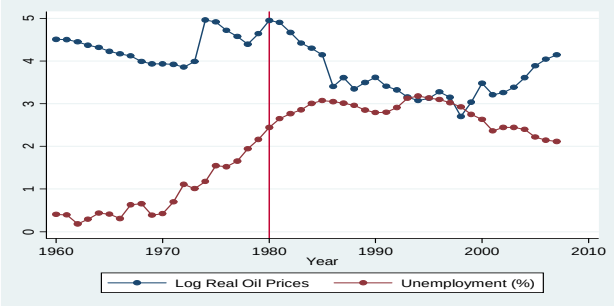


Fig. 4.e: Spain

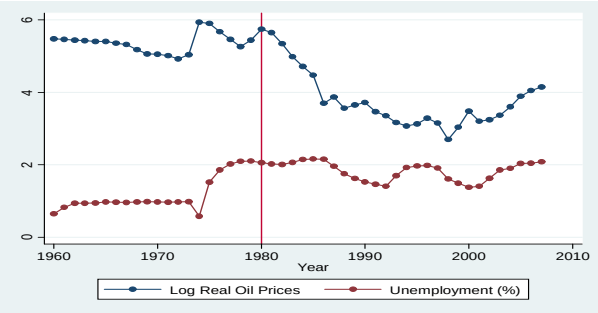


Fig. 4.f: Portugal

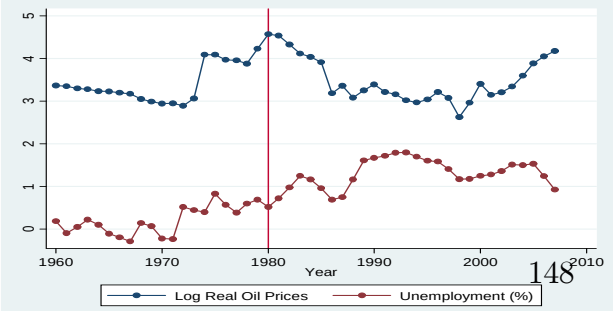


Fig. 4.g: Norway

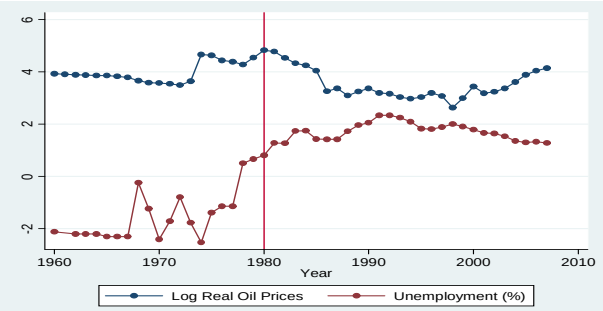


Fig. 4.h: New Zealand

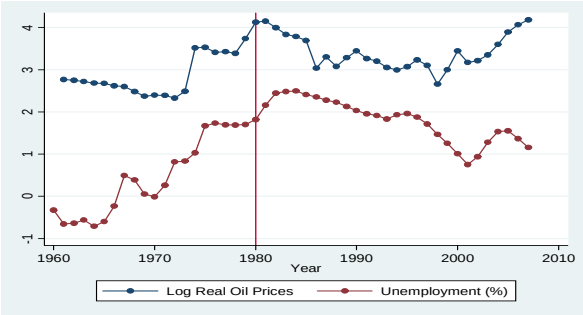


Fig. 4.i: Netherlands

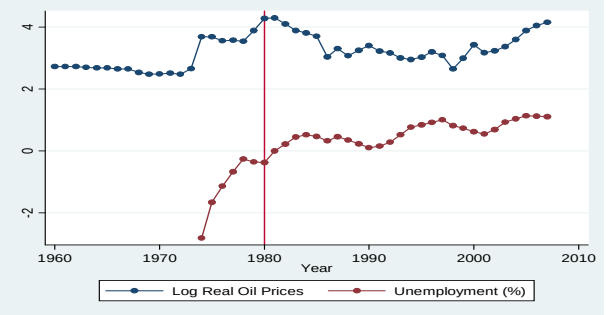


Fig. 4.j: Luxemburg

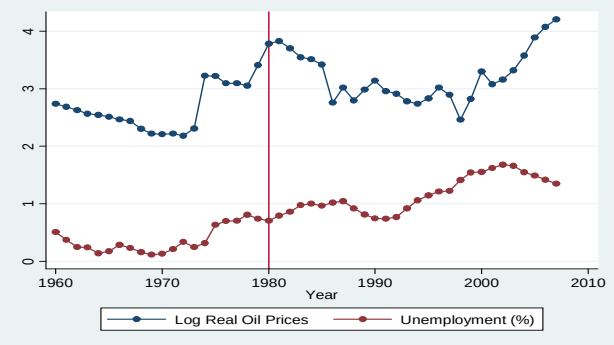


Fig. 4.k: Japan

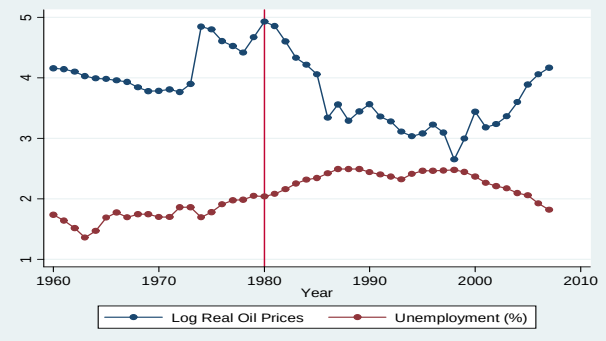


Fig. 4.l: Italy

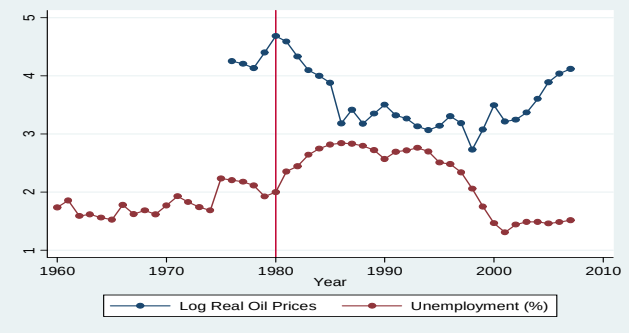


Fig. 4.m: Ireland

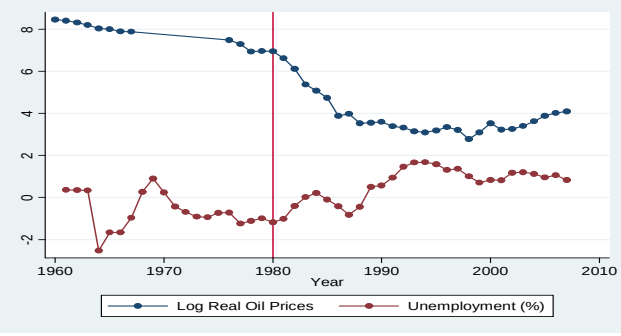


Fig. 4.n: Iceland

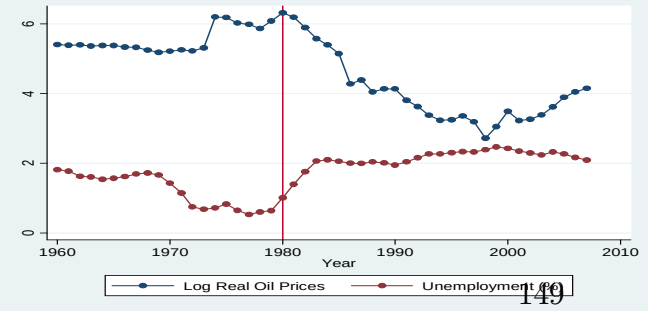


Fig. 4.o: Greece

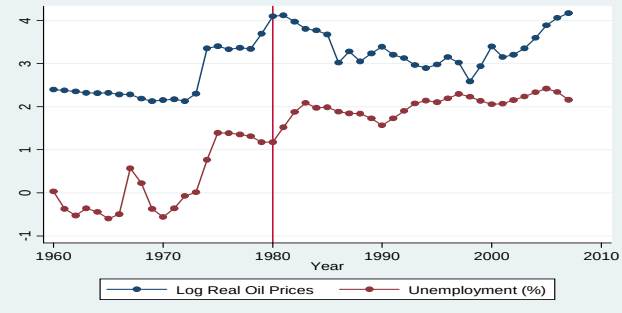


Fig. 4.p: Germany

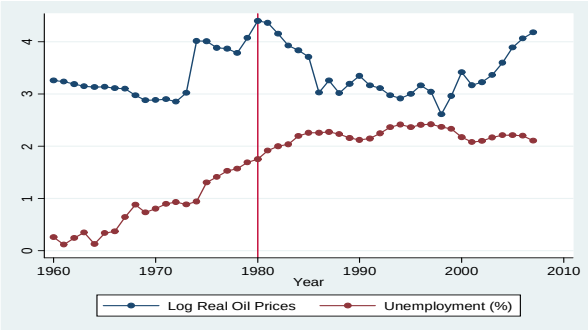


Fig. 4.q: France

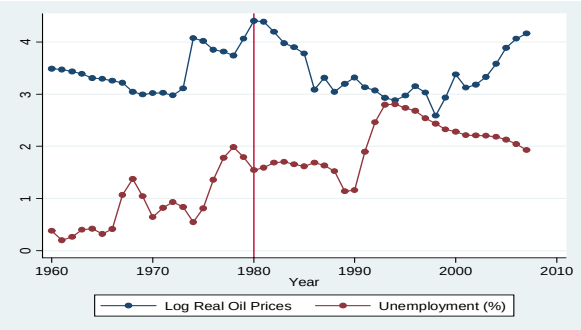


Fig. 4.r: Finland

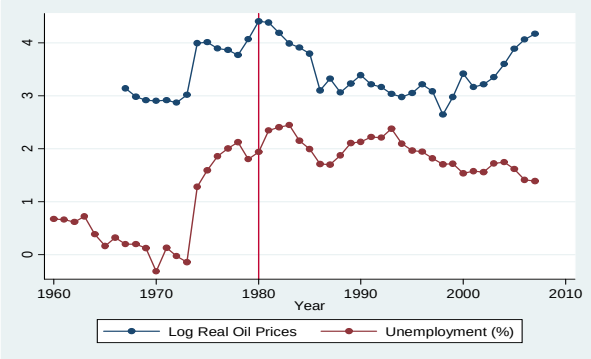


Fig. 4.s: Denmark

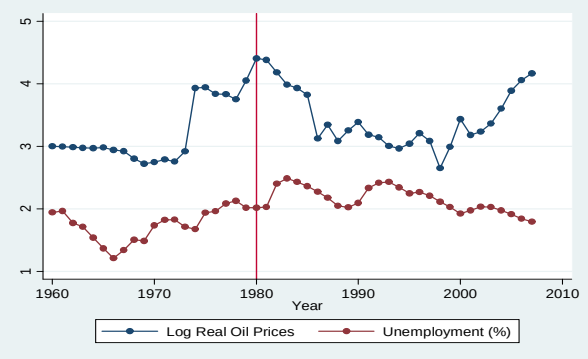


Fig. 4.t: Canada

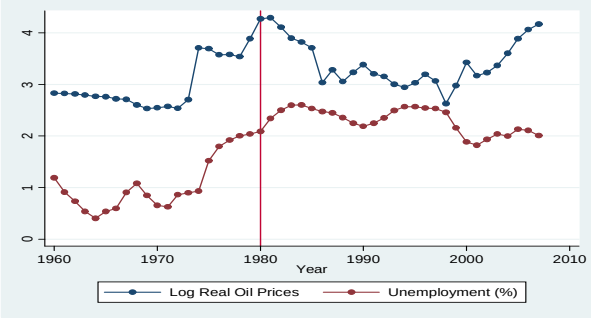


Fig. 4.u: Belgium

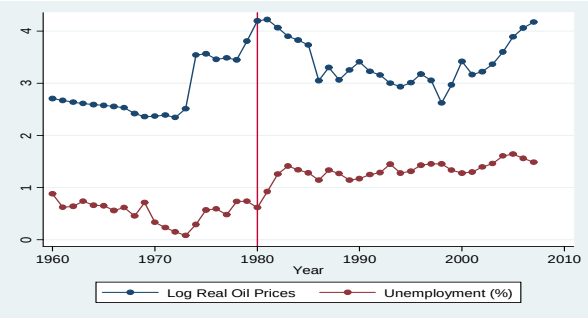


Fig. 4.v: Austria

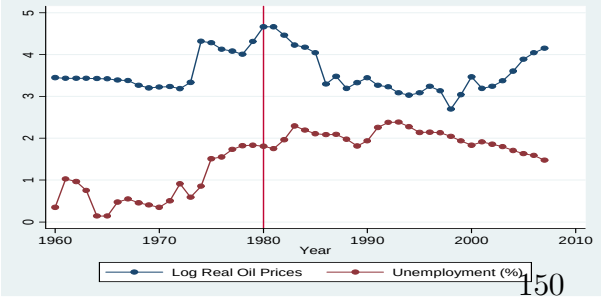


Fig. 4.w: Australia

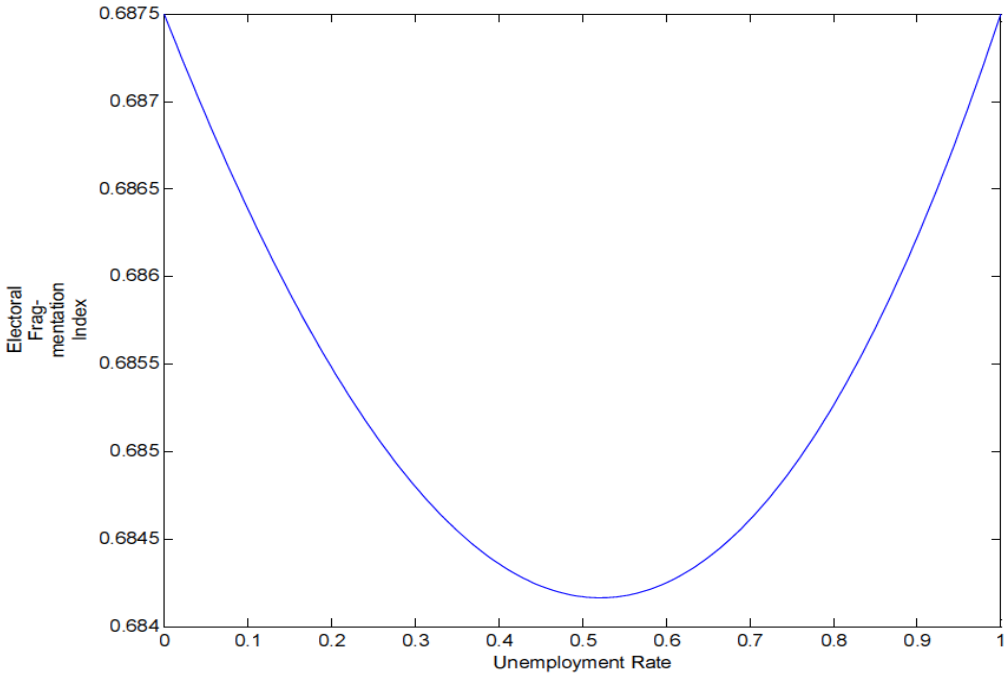


Fig. B.5a: Electoral Fragmentation for calibrated values of m and τ (OECD averages)

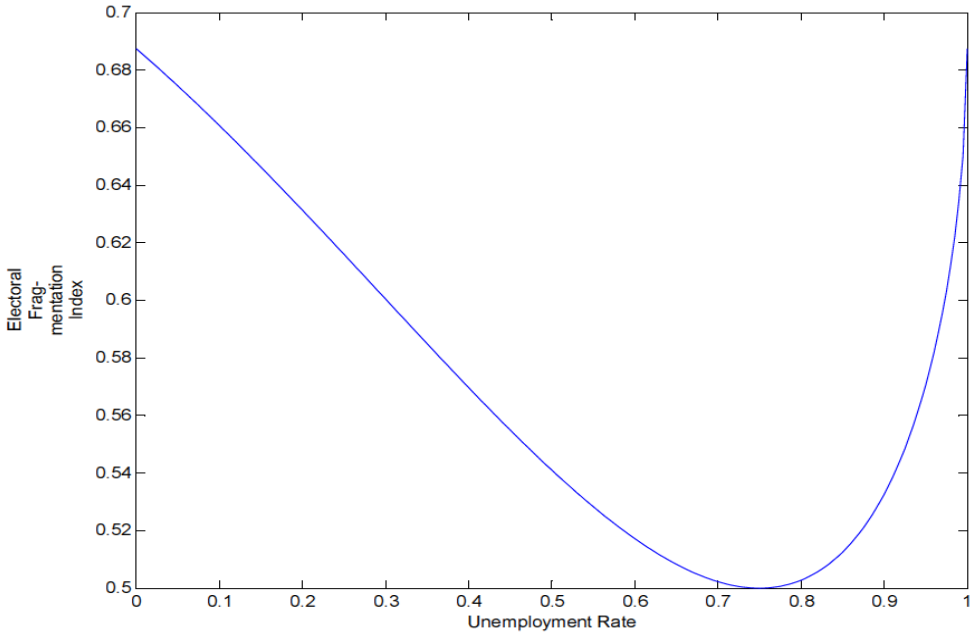


Fig. B.5b: Electoral Fragmentation for $m = 0$ and $\tau = 1$.

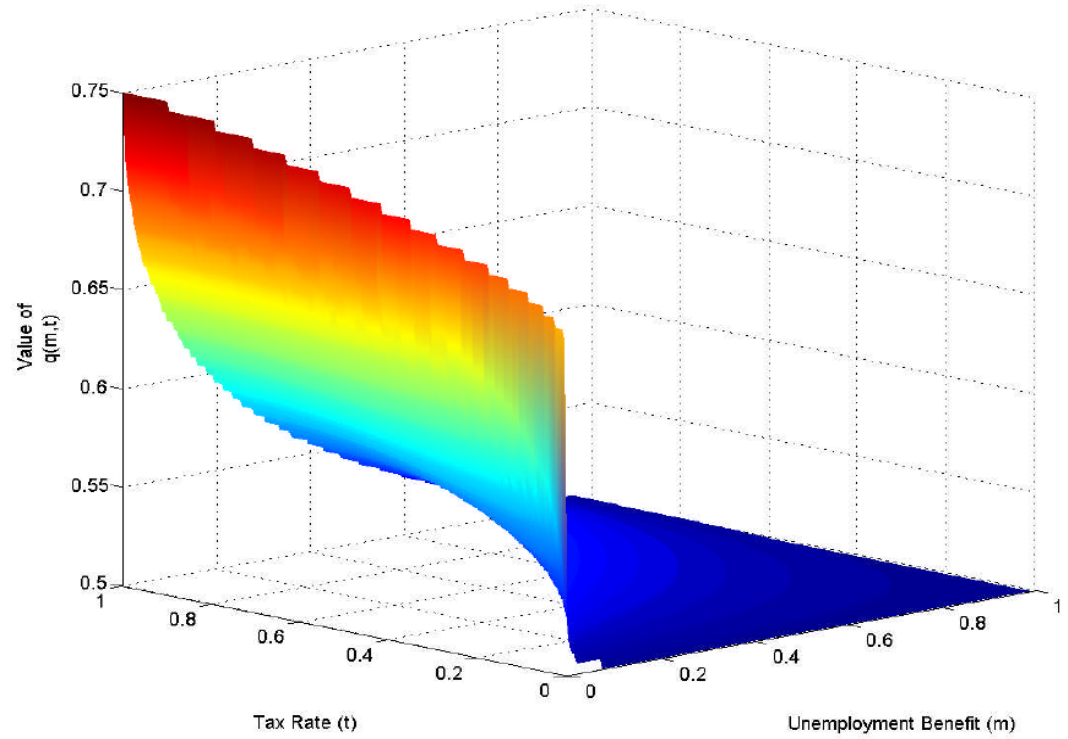


Fig. B.6a: "Tolerance" levels of Unemployment $\tilde{q}(m, \tau)$, as a function of $m, \tau \in [0, 1]$.

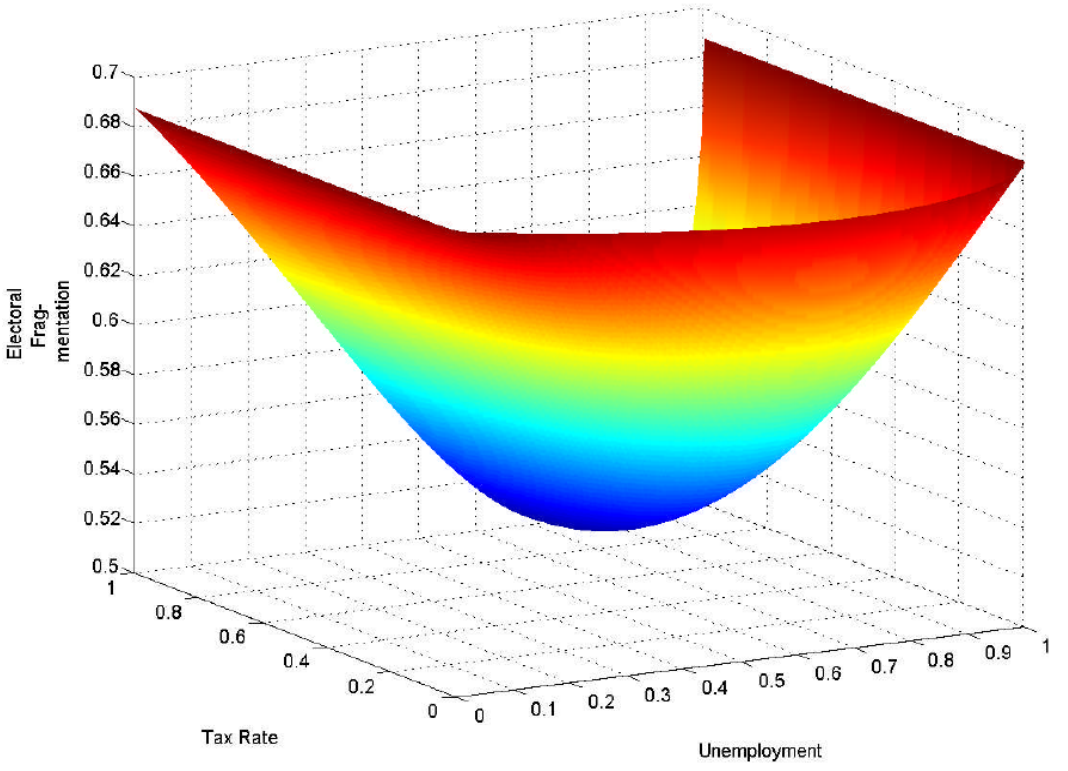


Fig. B.6b: Graphical Representation of Propositions 3 and 4

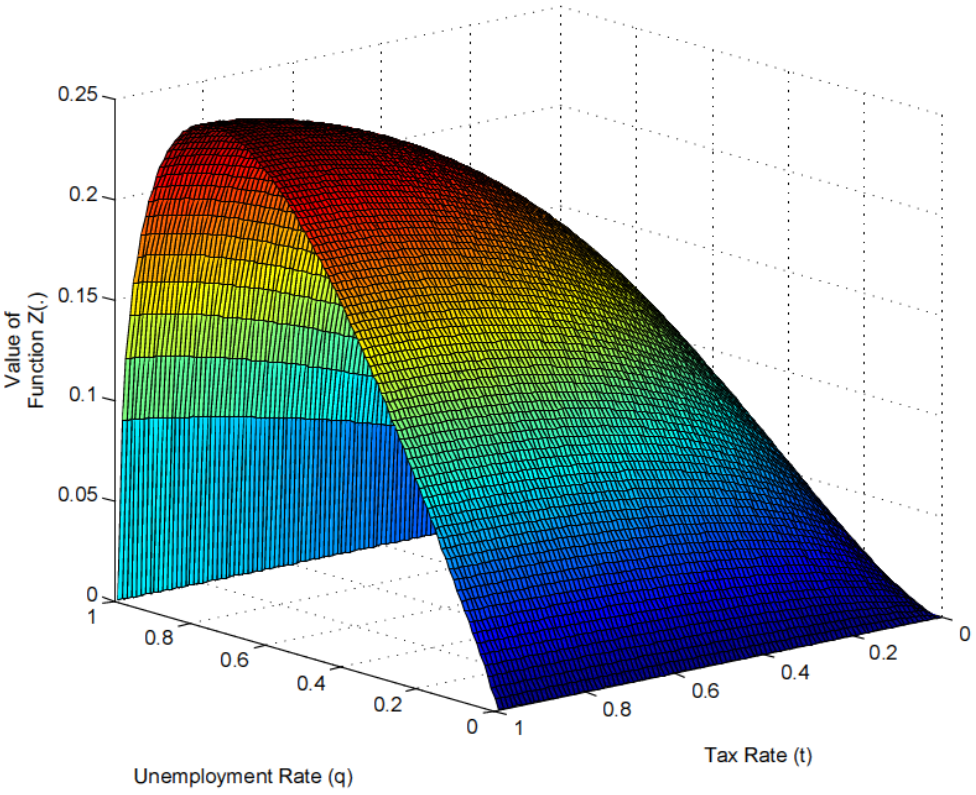


Fig. B.7.a: Net gain in votes for a party proposing high tax-rate as a function of q and τ

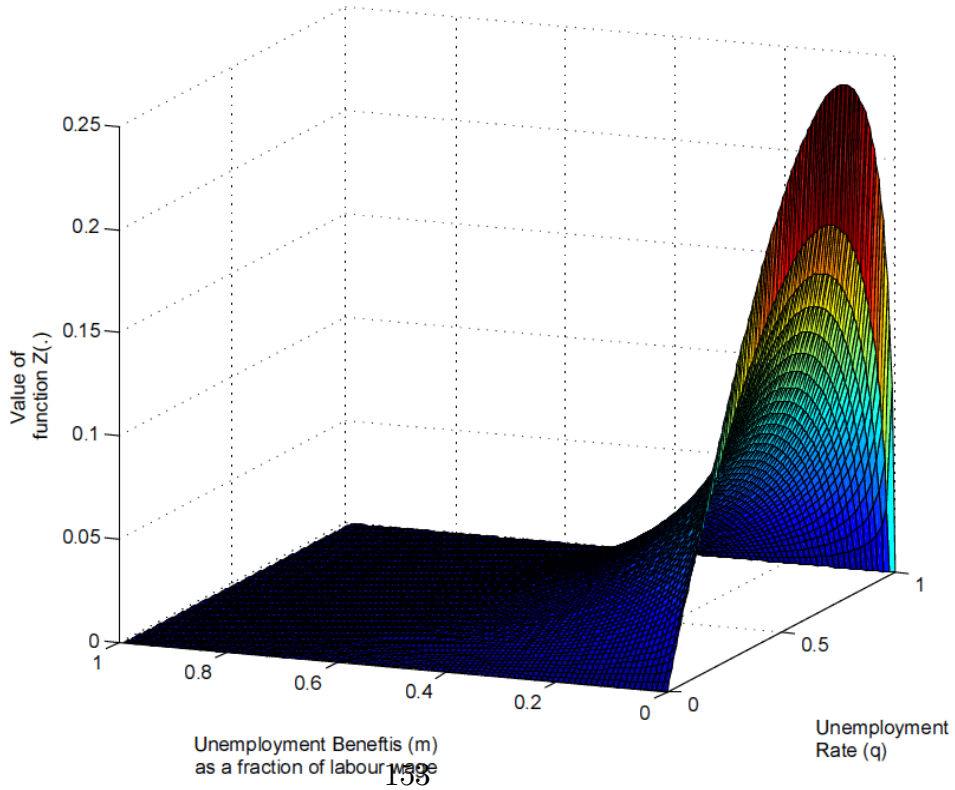


Fig. B.7.b: Net gain in votes for a party proposing high tax-rate as a function of q and m

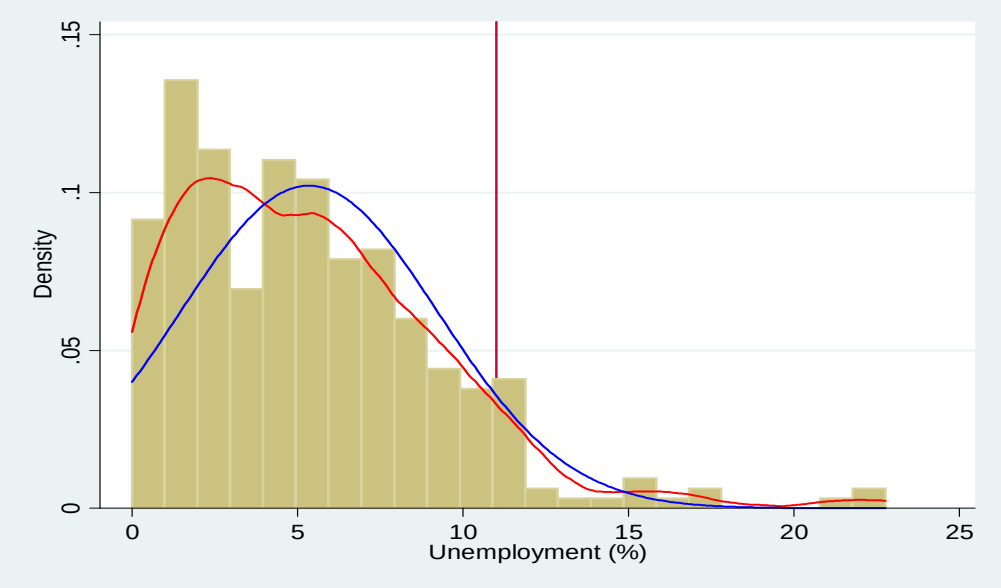


Fig. B.8: Kernel (red) and Normal (blue) simulated distributions of unemployment rates

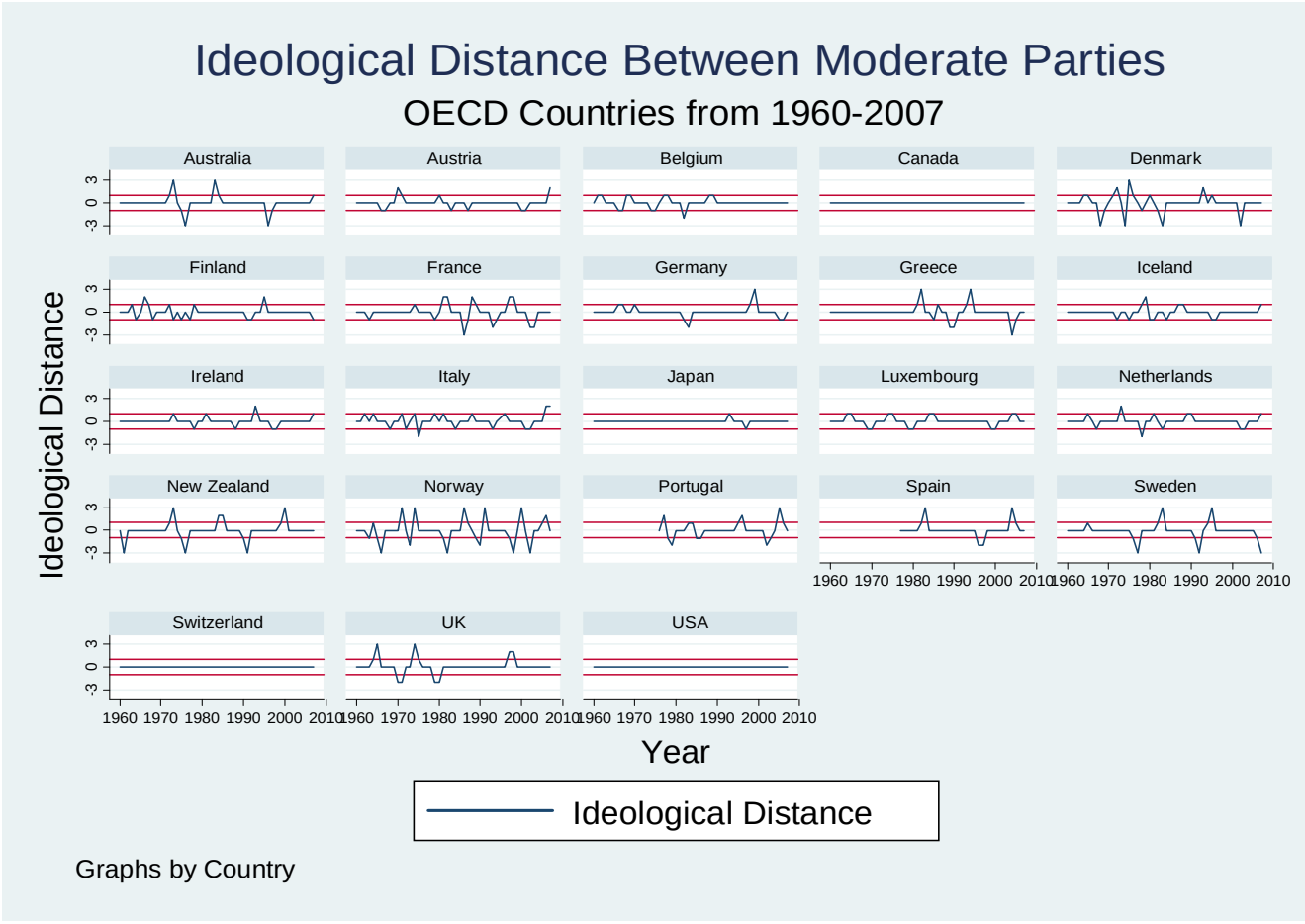


Fig. B.9: Ideological Convergence of Moderate Parties in OECD Countries overtime (1960-2007)

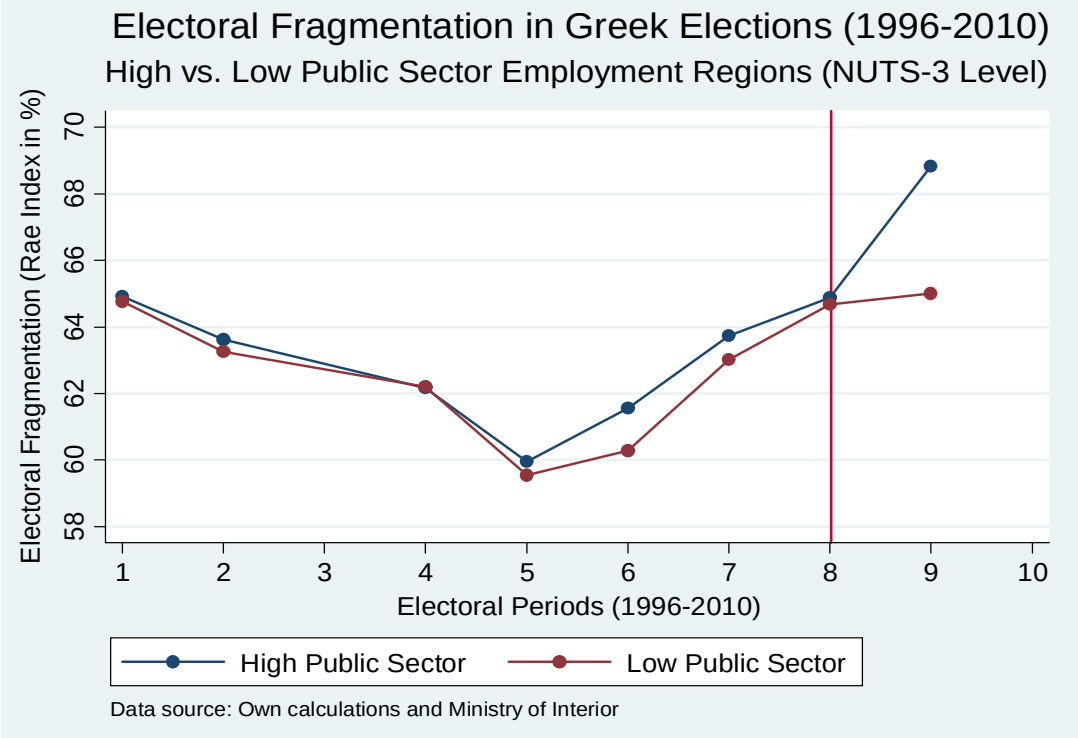


Fig. B.10: The Differential Impact of the Shock on Regions with High Public Sector

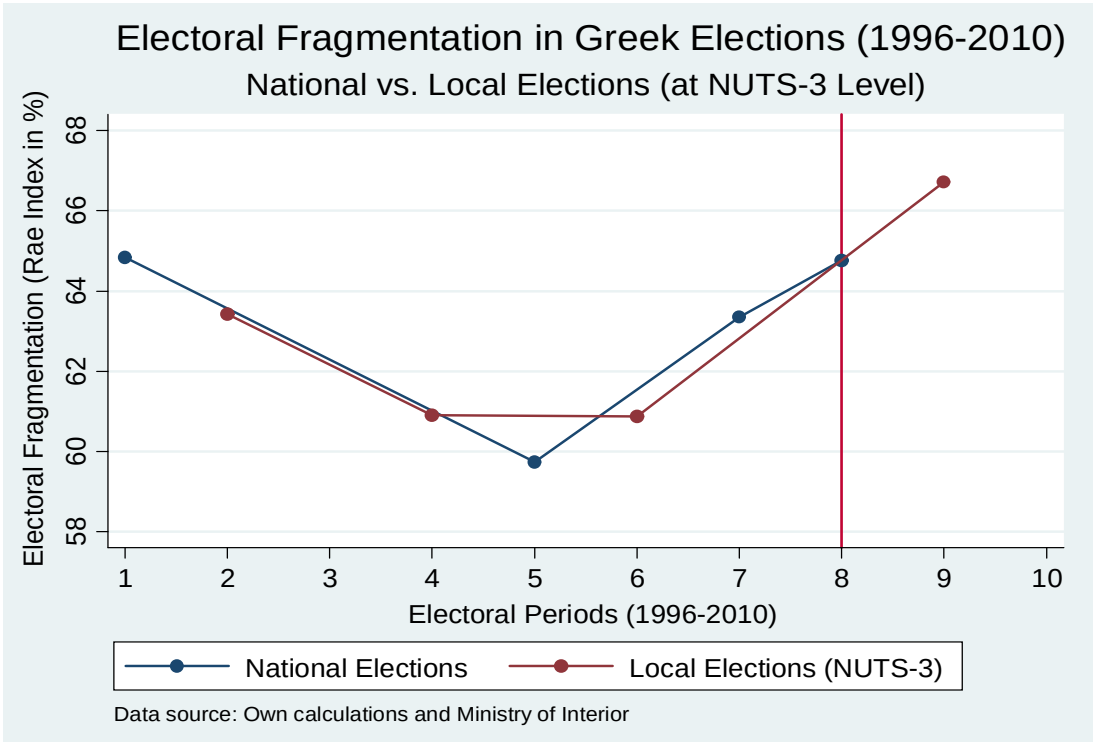


Fig. B.11: The Identical Trend of Electoral Fragmentation among National and Local Elections

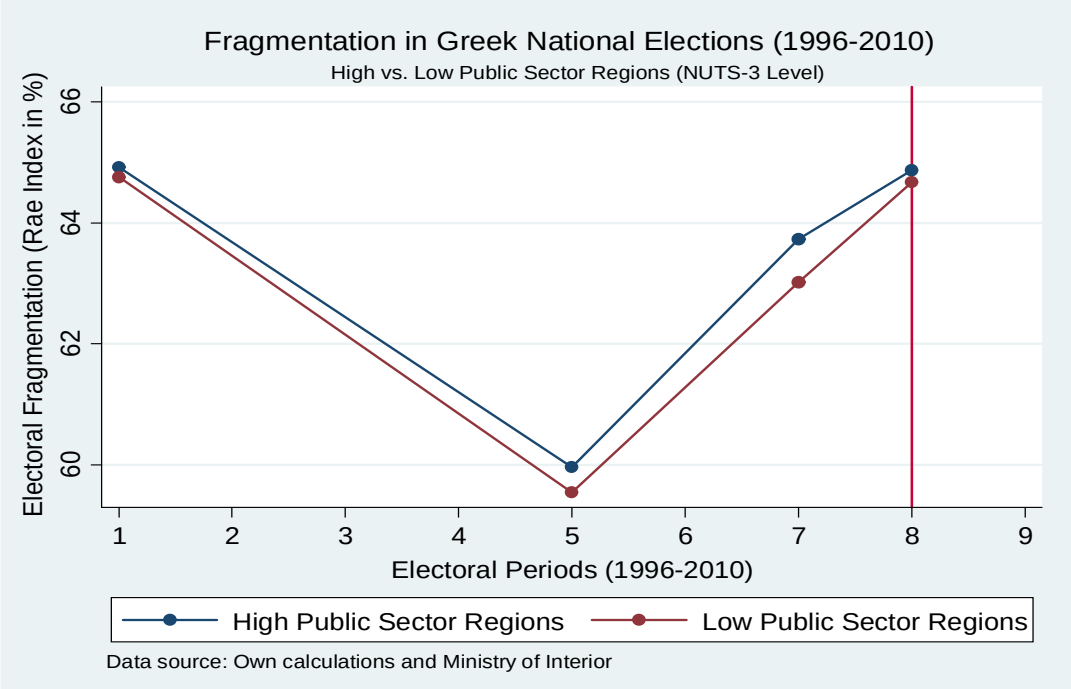


Fig. B.12.a: *National Elections*: Pre-shock Trend of Electoral Fragmentation across High and Low Public Sector Regions

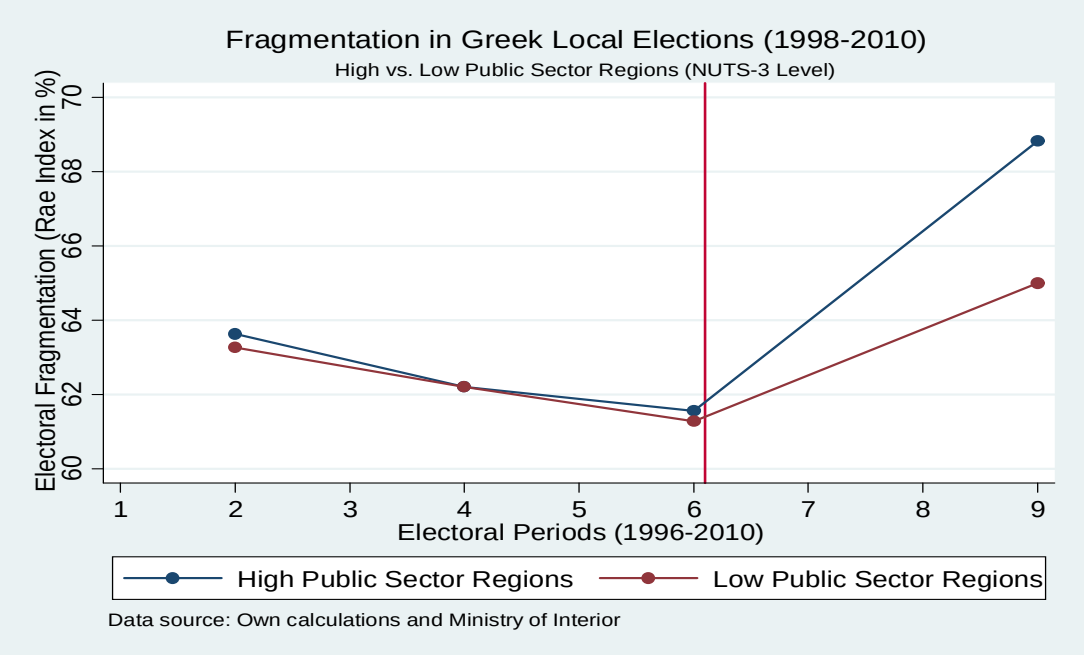


Fig. B.12.b: *Local Elections*: Pre-shock Trend of Electoral Fragmentation across High and Low Public Sector Regions

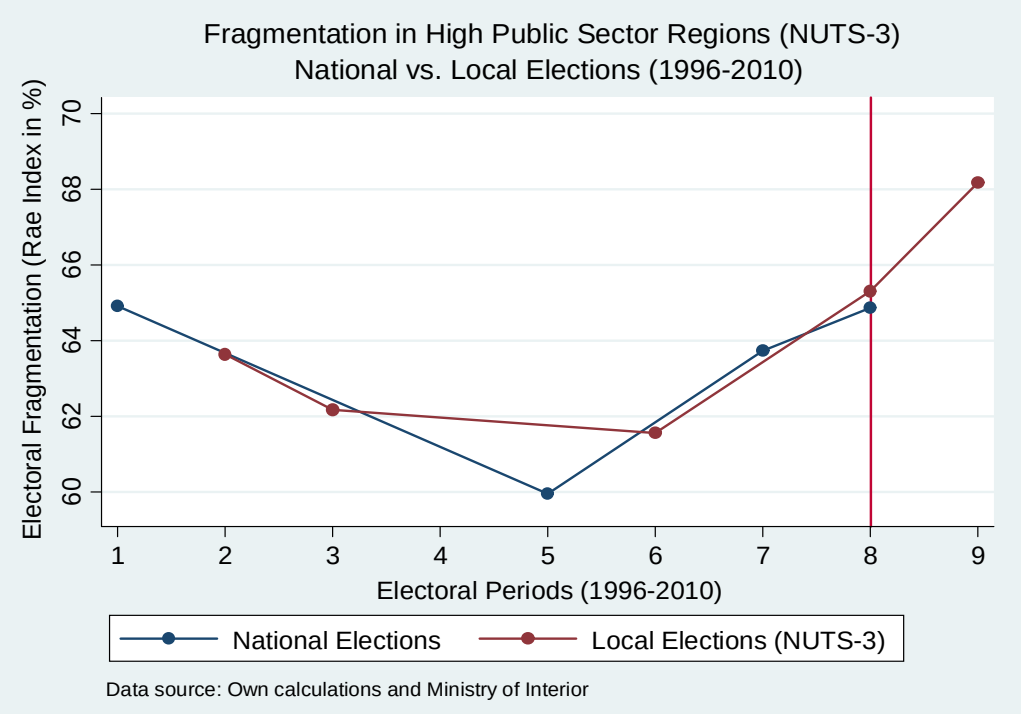


Fig. B.13.a: Pre-shock Trend of Electoral Fragmentation in Local & National Elections within High Public Sector Regions (NUTS-3)

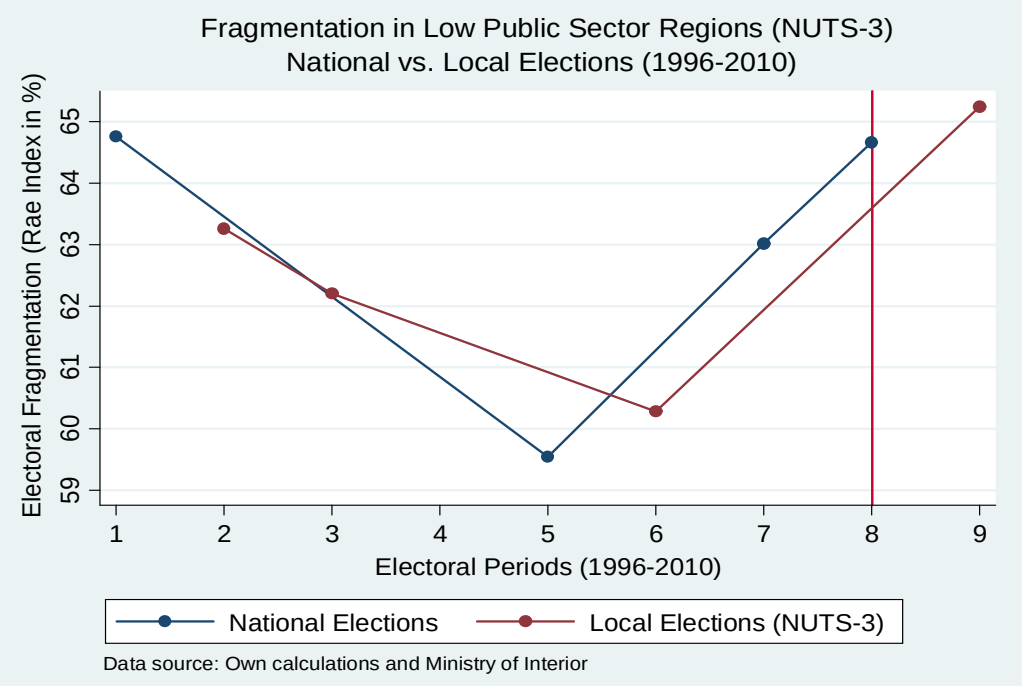


Fig. B.13.b: Pre-shock Trend of Electoral Fragmentation in Local & National Elections within Low Public Sector Regions (NUTS-3)

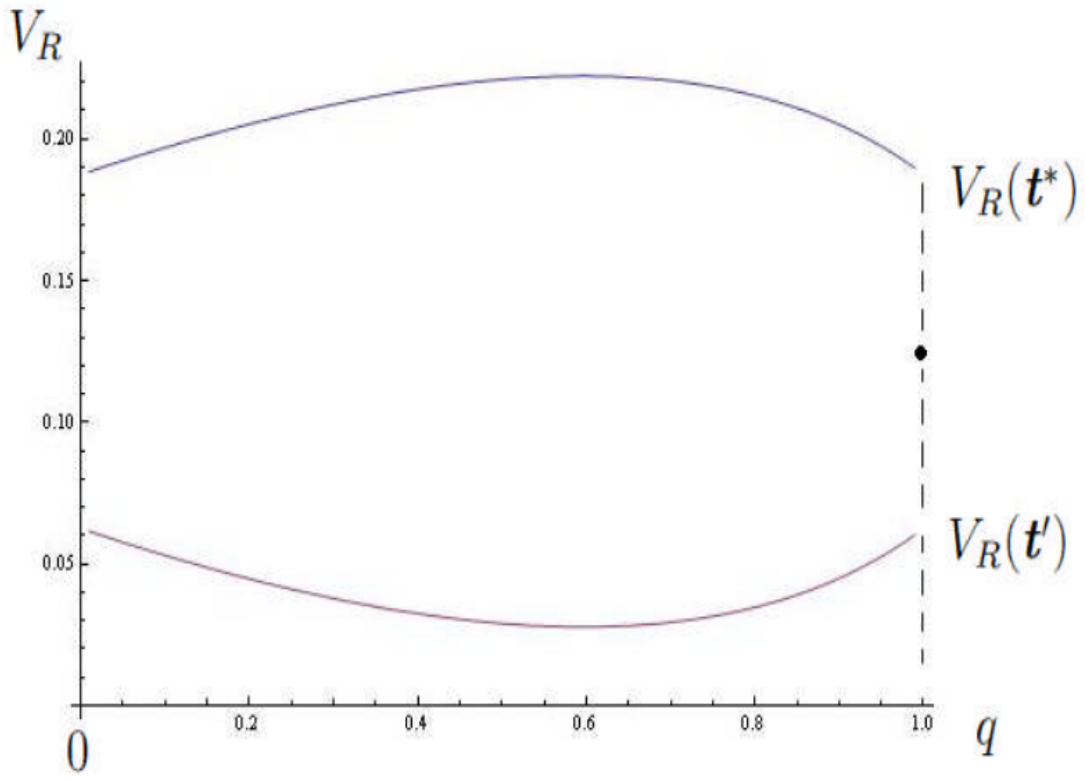


Fig. B.14: Utility V_R of a moderate party R, as a function of $q \in (0,1)$ for each of the two possible strategies: equilibrium strategy ($t_R^* = \tau$) resulting in payoff $V_R(\boldsymbol{t}^*)$ and from a deviation to $t'_R = 0$, where $t'_{-R} = t^*_{-R}$ for every other party, resulting in payoff $V_R(\boldsymbol{t}')$

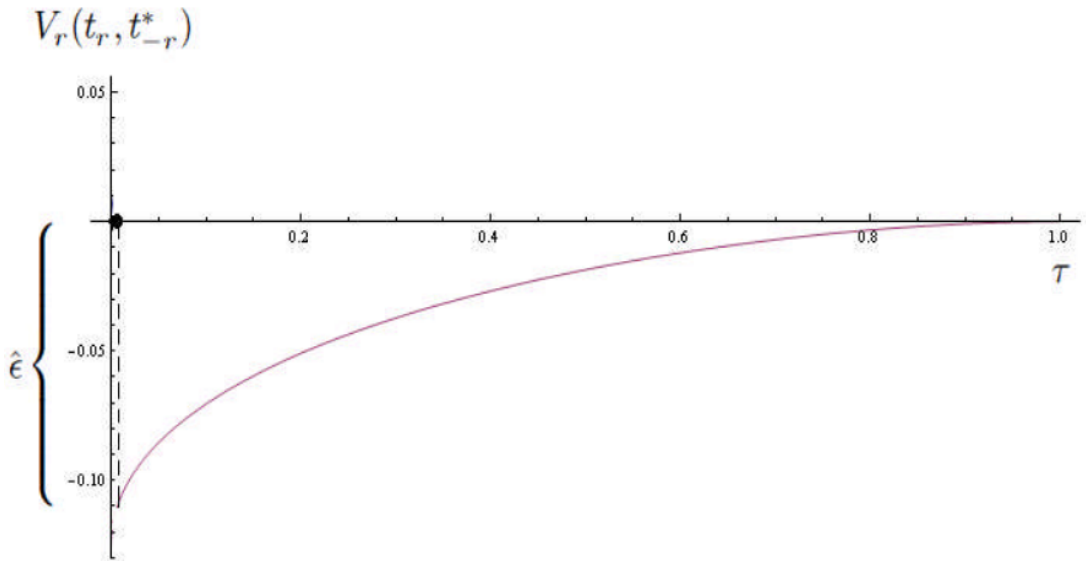


Fig. B.15.a: Utility $V_r(t_r, t^*_{-r})$ for extremist party r as a function of its tax-rate choice τ, given equilibrium play by other parties (the discontinuity is due to a change in outcome)

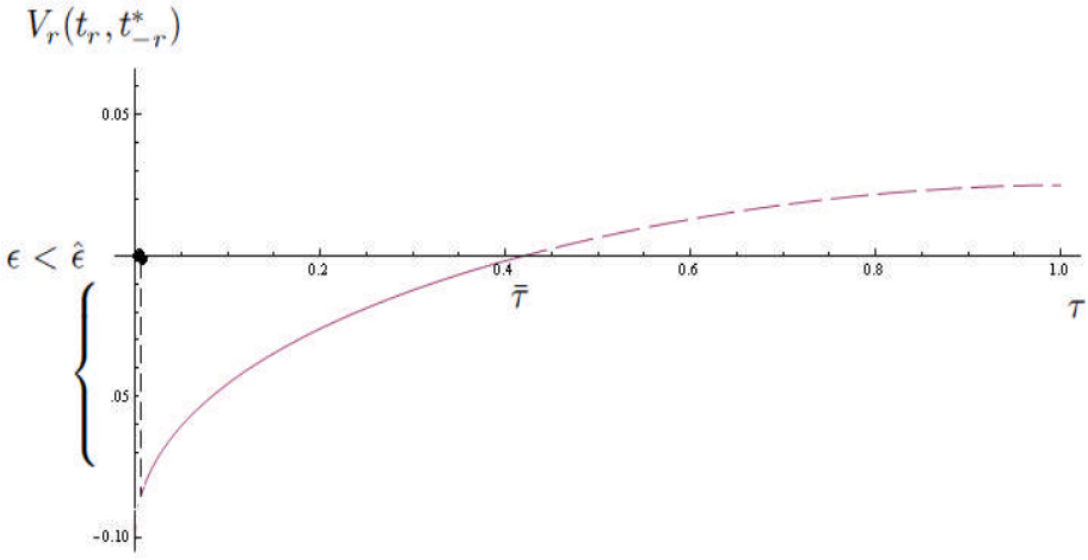


Fig. B.15.b: Utility $V_r(t_r, t^*_{-r})$ for extremist party r as a function of its tax-rate choice τ, given equilibrium play by other parties when the change in outcome ϵ is smaller than $\hat{\epsilon}$

B.8 Tables of Results

Table 1: *OLS Estimates of the Basic Model Under Various Econometric Specifications*

Dependent Variable	Basic Model	Year Effects	All Countries		Exclude US
Electoral Fragmentation (0-100)	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)
Unemployment Rate (%) - (β_1)	-.-	-.-	-.985	-.568	-.648
			(0.336)***	(0.269)**	(0.278)**
Unemployment-squared (β_2)	-.-	-.-	0.027	0.02	0.018
			(0.012)**	(0.009)**	(0.009)**
Inst. Constraints∗Unemployment	-.-	-.-	0.214	0.098	0.136
			(0.061)***	(0.06)	(0.062)**
Institutional Constraints (β_3)	1.822	1.122	-.184	-.131	-.433
	(0.709)**	(0.67)*	(0.961)	(0.828)	(0.91)
First-Past-the-Post ER (Dummy)	-8.067	-16.485	-11.988	5.022	2.133
	(3.209)**	(3.859)***	(3.446)***	(1.893)***	(2.170)
Number of Parties	-.-	-.-	-.-	1.748	1.759
				(0.295)***	(0.28)***
Incumbent Govt. Defeated	-1.978	-1.828	-1.919	-1.084	-1.142
	(0.88)**	(1.124)	(1.005)*	(0.854)	(0.886)
Other Controls?	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	No	Yes	Yes	Yes	Yes
Obs.	210	210	217	217	194
R^2	0.899	0.944	0.941	0.958	0.922

Note: *Robust Standard Errors, clustered at the Country level reported in parentheses. (***) $p < 0.01$; (**) $p < 0.05$; (*) $p < 0.10$. Variable institutional constraints (instcons) is the Index of institutional constraints of central state government according to Schmidt (1996); Minimum value=0; Maximum value=6; Range of data from 0 to 5, high values indicate powerful constraints, low values are indicative of a large maneuvering room available to central state government. Description: additive index composed of 6 dummy-variables ('1' = constraints, '0'=else) (1) EU membership=1, (2) degree of centralisation of state structure (federalism=1), (3) difficulty of amending constitutions (very difficult=1) (4) strong bicameralism =1 (5) central bank autonomy =1 (6) frequent referenda = 1. Source: Schmidt (1996: 172) transformed into time variant annual data. Data for central bank autonomy are taken from Beyeler (2007: 123). Period covered: 1960-2007. Missing: Greece 1967-1973, Portugal until 1975 and Spain until 1977. Incumbent Government Defeated Dummy takes the value of 1 if the incumbent lost the elections. Other controls include: GDP growth rate, Debt/GDP ratio, voter turnout, coalition government dummy, number of parties etc. Sample size varies (e.g. in Columns 1 and 2 we have less observations due to missing data on some of the control variables for the period from 1960-1970). Furthermore, in Column 5 we exclude the US from the sample because it has a Presidential system (and only two parties).*

Table 2: *Comparison of 2SLS with OLS estimates of the baseline model on the restricted sample (excluding oil producers and USA)*

	All Countries		Excluding US and Oil Producers (e.g. Norway)				
Dependent Variable	Rae Index of Electoral Fragmentation (range from 0-100)						Top-2
	2SLS	OLS	2SLS	OLS	2SLS	2SLS	2SLS
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Unemployment (in %)	-2.977	-.568	-3.073	-.648	-3.188	-2.120	8.266
	(1.345)**	(0.269)**	(1.167)***	(0.278)**	(1.130)***	(0.993)**	(2.451)***
Unemployment ^2	0.169	0.02	0.167	0.018	0.178	0.096	-.617
	(0.093)*	(0.009)**	(0.082)**	(0.009)**	(0.078)**	(0.091)	(0.227)***
Institutional Constraints	2.197	-.131	1.801	-.433	1.836	2.425	-.735
	(0.945)**	(0.828)	(0.97)*	(0.91)	(0.961)*	(3.590)	(2.669)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Instruments	3	N/A	3	N/A	3	2	3
Industry Weights?	Yes	N/A	Yes	N/A	No	No	Yes
Obs.	202	217	180	194	180	184	174
R^2	0.917	0.958	0.849	0.922	0.836	0.902	0.56
J-test score (χ^2)	0.82	N/A	0.44	N/A	0.62	N/A	0.003
(p-value)	0.36	-.-	0.51	-.-	0.43	-.-	0.95
$F-$statistic (1^{st}-stage)	8.1	N/A	7.4	N/A	7.0	4.9	5.6

Note: (***) $p < 0.01$; (**) $p < 0.05$; (*) $p < 0.10$. Robust standard errors, clustered at the country level reported in parentheses. Corrected standard errors reported in columns 1, 3, 5, 6 and 7 (2SLS models) by estimating the models using the "ivregress" routine in Stata. Instrumental Variable: Lags of oil price shocks. Oil price-shocks were estimated by predicting the residuals of an AR(2) process on real imported oil prices at refinery. In columns 1, 3 and 7 predicted oil price shocks were weighted by the constructed index of industrial intensity (using OECD data on industrial production and employment). In columns 5 and 6 no weights are used. In columns 1, 3, 5 and 7 the model is overidentified (2 endogenous regressors and 3 instruments) whereas, in column 6 the model is just-identified (2 instruments for 2 endogenous regressors). In column 7 we re-estimate the model presented in column 3 by replacing the dependent variable (electoral fragmentation index) with the sum of vote shares of the two dominant parties (indicated as Top-2). In all other columns the dependent variable is the standard index of electoral fragmentation (as defined in the main text). Whenever applicable (columns 1, 3, 5 and 7) the Sargan statistic of a Hansen/J-test on overidentifying restrictions is reported. Variable "Institutional constraints" is the Index of institutional constraints of central state government according to Schmidt (1996); Minimum value=0; Maximum value=6; Range of data from 0 to 5, high values indicate powerful constraints, low values are indicative of a large maneuvering room available to central state government. Description: additive index composed of 6 dummy-variables ('1' = constraints, '0'=else) (1) EU membership=1, (2) degree of centralisation of state structure (federalism=1), (3) difficulty of amending constitutions (very difficult=1) (4) strong bicameralism =1 (5) central bank autonomy =1 (6) frequent referenda = 1. Source: Schmidt (1996: 172) transformed into time variant annual data. Data for central bank autonomy are taken from Beyeler (2007: 123). Period covered: 1960-2007. Missing: Greece 1967-1973, Portugal until 1975 and Spain until 1977. Other controls include: first-past-the-post electoral rule dummy, incumbent government defeated dummy, number of parties, Debt/GDP ratio, GDP growth rate and government revenues (income tax receipts) as percent of GDP. Incumbent Govt Defeated Dummy takes the value of 1 if the incumbent has lost the elections.

Table 3: *Estimates of the overidentified 2SLS model on the restricted sample of countries (dropped USA and oil producers) using data averaged at the election term level under alternative model and instrument specifications*

Dependent Variable	Rae Index of Electoral (Party-system) Fragmentation (range 0-100)						Top-2
	Basic Model	Data Averaged at Election Term Level (3-year. averages)					
	2SLS(LDV)	2SLS	LDV	2SLS	LDV	2SLS	2SLS
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Unemployment Rate (in %)	-3.312	-3.272	-3.248	-3.319	-3.224	-2.233	6.207
(Electoral Term Average)	(0.965)***	(1.013)***	(1.153)***	(1.165)***	(1.330)**	(0.674)***	(2.206)***
Unemployment ˆ2	0.195	0.215	0.238	0.23	0.253	0.100	-.555
(Electoral Term Average)	(0.062)***	(0.082)***	(0.078)***	(0.093)**	(0.087)***	(0.059)*	(0.148)***
Institutional Constraints	1.924	0.377	0.118	0.237	-.116	1.266	4.075
	(1.000)*	(1.130)	(1.065)	(1.187)	(1.140)	(2.770)	(3.150)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Instruments	3	3	3	3	3	3	3
Industry weights?	Yes	Yes	Yes	No	No	No	Yes
Obs.	179	180	179	180	179	180	174
R^2	0.81	0.78	0.72	0.75	0.67	0.90	0.62
J-test score (χ^2)	0.348	0.265	0.16	0.408	0.276	0.26	0.04
(p-value)	0.56	0.61	0.69	0.52	0.60	0.60	0.85
F statistic (1^{st}- Stage)	6.9	3.4	3.1	2.5	2.4	3.3	3.7

Note: *(***) $p < 0.01$; (**) $p < 0.05$; (*) $p < 0.10$. Robust standard errors, clustered at the country level reported in parentheses. Corrected standard errors reported in columns 1 through 7 (2SLS models) by estimating the models using the "ivregress" routine in Stata. In columns 1, 3 and 5 a lagged dependent variable (LDV) was introduced into the model. Column 1 reports the estimates of the 2SLS model presented in column 3 of Table 2 with the addition of a lagged dependent variable (data not aggregated per electoral term). Columns 3 and 5 reproduce the estimates of Columns 2 and 4 using a Lagged Dependent Variable Model. In columns 2 through 7, all data were aggregated at the election term level (electoral term averages). In column 7 we re-estimate the model of column 2 by replacing the dependent variable (electoral fragmentation index) with the sum of vote shares of the two dominant parties (indicated as Top-2). In all other columns the dependent variable is the standard index of electoral fragmentation (as defined in the main text). Instrumental Variables: With the exception of column 6, in all other columns lags of oil price-shocks are used. Oil price shocks were estimated by predicting the residuals of an AR(2) process on real imported oil prices at refinery. In column 6, simple lags of real imported oil prices were employed. In columns 1-3 and 7 predicted oil price shocks were weighted by the index of industrial intensity constructed using OECD data. In columns 4 through 6 no weights are used. We use 3 lags in all specifications (overidentified model with 3 instruments) due to the use of averaged data at the election term level (in most cases 3 year averages). The Sargan statistic of a J-test on overidentifying restrictions (3 IV's and 2 endogenous regressors) is reported. Variable instcons is the Index of institutional constraints of central state government according to Schmidt (1996); Minimum value=0; Maximum value=6; Range of data from 0 to 5, high values indicate powerful constraints, low values are indicative of a large maneuvering room available to central state government. Description: additive index composed of 6 dummy-variables ('1' = constraints, '0'=else) (1) EU membership=1, (2) degree of centralisation of state structure (federalism=1), (3) difficulty of amending constitutions (very difficult=1) (4) strong bicameralism =1 (5) central bank autonomy =1 (6) frequent referenda = 1. Source: Schmidt (1996: 172) transformed into time variant annual data. Data for central bank autonomy are taken from Beyeler (2007: 123). Period covered: 1960-2007. Missing: Greece 1967-1973, Portugal until 1975 and Spain until 1977. Other controls include: first-past-the-post electoral rule dummy, number of parties, incumbent government defeated dummy, Debt/GDP ratio, GDP growth rate and government revenues (income tax receipts) as percent of GDP. Incumbent Govt Defeated Dummy takes the value of 1 if the incumbent has lost the elections.*

Table 4: *Comparison of 2SLS and LIML estimates of the effect of unemployment (key explanotory variable) on fragmentation (and the vote shares of dominant parties) in the overidentified models (1 endogenous regressor and multiple lags/ IV's) under various alternative combinations of IV specifications and control variables*

Dependent Variable	Rae Index of Electoral Fragmentation (range 0-100)					Top-2 Parties' Vote Shares		
	Baseline Model			Alternative IV (No Weights)			Baseline Model	
Unemployment Rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2SLS	-1.231	-.812	-.854	-.933	-1.042	4.912	4.064	2.173
	(0.528)**	(0.4)**	(0.371)**	(0.469)**	(0.504)**	(2.471)**	(1.755)**	(0.915)**
R^2	0.87	0.91	0.90	0.90	0.886	0.74	0.79	0.87
J-test score (χ^2)	0.19	0.68	3.46	1.12	3.31	0.04	0.02	2.87
(p-value)	0.66	0.41	0.18	0.29	0.19	0.83	0.90	0.24
LIML	-1.248	-.853	-1.205	-1.057	-1.803	4.965	4.072	3.454
	(0.535)**	(0.4)**	(0.594)**	(0.541)**	(1.149)	(2.507)**	(1.759)**	(1.938)*
R^2	0.87	0.91	0.87	0.895	0.81	0.735	0.79	0.82
J-test score (Rubin χ^2)	0.12	0.67	1.56	1.08	4.24	0.04	0.02	4.07
(p-value)	0.73	0.41	0.22	0.30	0.12	0.83	0.90	0.13
Weights	Yes	Yes	Yes	No	No	No	Yes	Yes
Num. of excluded IV's	2	2	3	2	3	2	2	3
LDV?	No	Yes	No	Yes	No	N/A	N/A	N/A
Other Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F statistic (1^{st}-Stage)	4.52	4.24	3.54	2.80	2.10	1.77	2.46	3.14
Obs.	182	183	180	183	182	174	174	174

Note: *(***) $p < 0.01$; (**) $p < 0.05$; (*) $p < 0.10$. Robust standard errors, clustered at the Country level reported in parentheses. Corrected standard errors reported in all columns (2SLS and LIML models) by estimating the models using the "ivregress" routine in Stata. Columns 1 through 3 present the 2SLS and LIML estimates of the baseline model. Columns 4 and 5 replicate the estimates of Columns 2 and 3 using alternative instruments. Columns 6-8 reproduce the estimates of the same (LIML or 2SLS) model as in columns 1,3 and 5 repsectively,by replacing our main dependent variable (electoral fragmentation) with the sum of vote shares or the two (top) dominant parties. In columns 2 and 4 we add a lagged dependent variable to the models. In all columns data are averaged at the election term level. We use at least 2 instruments (lags of oil price shocks) and all models are overidntified (one endogenous regressor and at least two instruments). For the 2SLS models we report the Sargan statistic of a J-test on overidentifying restrictions. For the LIML models we report the Anderson-Rubin statistic. In all columns the first-stage F-score on the excluded IV's is reported. Instrumental Variables: In all columns, lags of oil price-shocks are used. Oil price shocks were estimated by predicting the residuals of an AR(2) process on real imported oil prices at refinery. In columns 1-3 and 7-8 predicted oil price shocks were weighted by the index of industrial intensity (constructed from OECD data). In columns 4-6 no weights are used. Variable "Institutional constraints" is the index of institutional constraints of central state government according to Schmidt (1996); Minimum value=0; Maximum value=6; Range of data from 0 to 5, high values indicate powerful constraints, low values are indicative of a large maneuvering room available to central state government. Description: additive index composed of 6 dummy-variables ('1' = constraints, '0'=else) (1) EU membership=1, (2) degree of centralisation of state structure (federalism=1), (3) difficulty of amending constitutions (very difficult=1) (4) strong bicameralism =1 (5) central bank autonomy =1 (6) frequent referenda = 1. Source: Schmidt (1996: 172) transformed into time variant annual data. Data for central bank autonomy are taken from Beyeler (2007: 123). Period covered: 1960-2007. Missing: Greece 1967-1973, Portugal until 1975 and Spain until 1977. Other controls include: first-past-the-post electoral rule dummy, number of parties, incumbent government defeated, debt/GDP ratio, GDP growth rate and government revenues (income tax receipts) as % of GDP. Incumbent Govt Defeated Dummy takes the value of 1 if the incumbent has lost the elections.*

Table 5: *Estimation results of the just-identified IV model (with one endogenous regressor) on the restricted sample of countries (dropped USA and oil producers) under various alternative econometric specifications*

Dependent Variable	Electoral (Party-System) Fragmentation (Rae Index from 0-100)						Top-2 Vote Shares	
Model Specification	Baseline IV Model		No Weights		Alternative IV		Baseline IV Model	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unemployment Rate (%)	-1.089	-.800	-1.270	-.965	-1.223	-.794	2.854	2.239
	(0.448)**	(0.382)**	(0.545)**	(0.466)**	(0.478)**	(0.363)**	(1.330)**	(1.357)*
Institutional Constraints	1.119	0.916	1.262	1.059	1.225	0.911	-.522	0.383
	(0.923)	(0.77)	(1.045)	(0.893)	(0.997)	(0.777)	(2.205)	(1.958)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instrument	Oil Price Shocks (predicted AR(2) residuals)				Real Oil Prices		Oil Price Shocks	
Industry-related weights?	Yes	Yes	No	No	No	No	Yes	No
Number of Instruments	1	1	1	1	1	1	1	1
LDV?	No	Yes	No	Yes	No	Yes	No	No
Obs.	183	182	183	182	183	182	183	175
R^2	0.874	0.909	0.856	0.897	0.861	0.909	0.845	0.849
F statistic (1^{st}-Stage)	14.45	11.11	18.84	13.92	18.15	12.77	9.82	23.51

Note: *(***) $p < 0.01$; (**) $p < 0.05$; (*) $p < 0.10$. Robust standard errors, clustered at the country level reported in parentheses. Corrected standard errors reported in all columns, since the models were estimated using the "ivregress" routine in Stata. Columns 2, 4 and 6 reproduce the estimates of the same IV model, as in columns 1, 3 and 5 repsectively, with the addition of a lagged dependent variable (LDV). Columns 7 and 8 reproduce the estimates of models in columns 1 and 3 by replacing the standard dependent variable (electoral fragmentation index) with the sum of vote shares of the two dominant (top-2) parties. In all columns the model is just-identified. In all columns the F-statistic of the first-stage on the excluded IV is reported. IV's: In all columns, but columns 5 and 6 lags of oil price-shocks are used. Oil price shocks were estimated by predicting the residuals of an AR(2) process on real imported oil prices at refinery. In columns 5 and 6 ordinary lags of real imported oil prices were employed. In columns 1, 2 and 7 predicted oil price shocks were weighted by the index of industrial intensity, constructed using OECD data. In columns 3-6 and 8 no weights are used. We use only 1 lag (instrument) in all specifications (just-identified models). Variable "Institutional constraints" is the index of institutional constraints of central state government according to Schmidt (1996); Minimum value=0; Maximum value=6; Range of data from 0 to 5, high values indicate powerful constraints, low values are indicative of a large maneuvering room available to central state government. Description: additive index composed of 6 dummy-variables ('1' = constraints, '0'=else) (1) EU membership=1, (2) degree of centralisation of state structure (federalism=1), (3) difficulty of amending constitutions (very difficult=1) (4) strong bicameralism =1 (5) central bank autonomy =1 (6) frequent referenda = 1. Source: Schmidt (1996: 172) transformed into time variant annual data. Data for central bank autonomy are taken from Beyeler (2007: 123). Period covered: 1960-2007. Missing: Greece 1967-1973, Portugal until 1975 and Spain until 1977. Other controls include: first-past-the-post electoral rule dummy, number of parties, incumbent government defeated dummy, debt/GDP ratio, GDP growth rate and the share of government revenues (income tax receipts) as % of GDP. Incumbent Govt Defeated Dummy takes the value of 1 if the incumbent has lost the elections.*

Table 6: *First-stage OLS estimates of the overidentified 2SLS (Tables B.2 and B.3) and the just-indentified IV model (Table B.5) on the restricted sample of countries (excluding oil producers and the US) under various alternative IV specifications.*

Dependent Variable:	OLS Regressions of the Excluded IV (Oil Prices & Oil Price Shocks) on Unemployment								
Unemployment Rate(%)	Electoral Term Avg.		At Election Year (Not Averaged over the whole Electoral Term)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IV Specification									
L. Oil Price shocks Weighted AR(2) res.	-.029 $(0.014)^{**}$		-.034 $(0.015)^{**}$	-.011 $(0.003)^{***}$	-.011 $(0.003)^{***}$	-.-	-.-	-.-	-.-
L. Oil Price shocks Unweighted AR(2) res.	-.-	-.025 $(0.013)^{**}$		-.-	-.-	-.010 $(0.002)^{***}$	-.010 $(0.003)^{***}$	-.-	-.-
L. Real Oil Prices (at refinery)	-.-			-.-	-.-	-.-	-.-	-.009 $(0.002)^{***}$	-.010 $(0.003)^{***}$
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Weights?	Yes	No	Yes	Yes	Yes	No	No	No	No
Number of Lags	3	3	3	1	1	1	1	1	1
Obs.	180	180	180	183	182	183	182	183	182
R^2	0.86	0.86	0.84	0.83	0.83	0.83	0.83	0.83	0.83
$F-$ statistic	3.42	2.46	7.40	14.45	11.11	18.84	13.92	18.15	12.77

Note: *Robust standard errors, corrected and clustered at the country level reported in parentheses. (***) $p < 0.001$; (**) $p < 0.01$; (*) $p < 0.05$. Columns 1 and 2 are the first-stages of overidentified 2SLS model with averaged data at the electoral term lelvel (columns 2 and 4 in Table 3). Column 3 is the first-stage of the baseline model (2SLS) presented in column 3, Table 2. Columns 4 to 9 present the estimates of the first-stage OLS regressions of the just-identified IV models presented in Columns 1-6 (Table 5) respectively. F-statistics on the excluded IV's reported in all columns. Instrumental Variables: In all columns, but columns 8 and 9, lags of oil price-shocks are used. Oil price shocks were estimated by predicting the residuals of an AR(2) process on real imported oil prices at refinery. In columns 8 and 9 ordinary lags of real imported oil prices were employed. In columns 1, 3, 4 and 5 predicted oil price shocks were weighted by the index of industrial intensity (constructed using OECD data on industrial employment and activity). In column 2 and columns 6-9 no weights are used. In columns 1-3 we use multiple instruments (lags) as the models are overidentified (and the data are averaged at the election term level). In the remaining columns (4-9) we use only 1 lag (instrtument) since the models are just-identified (models presented in columns 1-6 of Table 5) and as a consequence, unemployment rate is measured at election year (not averaged over the whole electoral term, since this would require the usage of more than one lag). Other controls include: first-past-the-post electoral rule dummy, number of parties, degree of institutional constraints, incumbent government defeated dummy, Debt/GDP ratio, GDP growth rate, government revenues (income tax receipts) as percent of GDP and coalition government dummy. Variable "Institutional constraints" is the index of institutional constraints of central state government according to Schmidt (1996); Minimum value=0; Maximum value=6; Range of data from 0 to 5, high values indicate powerful constraints, low values are indicative of a large maneuvering room available to central state government. Description: additive index composed of 6 dummy-variables ('1' = constraints, '0'=else) (1) EU membership=1, (2) degree of centralisation of state structure (federalism=1), (3) difficulty of amending constitutions (very difficult=1) (4) strong bicameralism =1 (5) central bank autonomy =1 (6) frequent referenda = 1. Source: Schmidt (1996: 172) transformed into time variant annual data. Data for central bank autonomy are taken from Beyeler (2007: 123). Period covered: 1960-2007. Missing: Greece 1967-1973, Portugal until 1975 and Spain until 1977. Incumbent Government Defeated Dummy takes the value of 1 if the incumbent has lost the elections.*

Table 7: *Reduced form OLS estimates on the effect of oil price shocks (Instrumental Variable) on electoral fragmentation and the re-election probability of the incumbent (overidentified 2SLS and just-identified IV models on the restricted sample of countries, excluding oil producers and the US)*

Dependent Variable	Electoral Fragmentation (Rae Index 0-100)				Incumbent Lost Elections		
	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L. Oil Price shocks (Weighted AR(2) residuals)	0.030 (0.0128)**	0.012 (0.007)*	-.-	-.-	0.0004 (0.0005)	-.-	-.-
L. Oil Price shocks (Unweighted AR(2) residuals)	-.-	-.-	0.012 (0.0069)*	-.-	-.-	0.0005 (0.0005)	-.-
L. Real Imported Oil Prices (at refinery)	-.-	-.-	-.-	0.012 (0.0051)**	-.-	-.-	0.0004 (0.0005)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industrial Intensity Weights?	Yes	Yes	No	No	Yes	No	No
Lags	3	1	1	1	1	1	1
Obs.	180	183	183	183	183	183	183
R^2	0.93	0.93	0.925	0.925	0.57	0.57	0.57
F statistic							

Note: *Robust standard errors, corrected and clustered at the country level reported in parantheses. (***) $p < 0.01$; (**) $p < 0.05$; (*) $p < 0.10$. Incumbent Lost Elections is a dummy variable that takes the value of 1 if the incumbent was defeated by the challenger in recent elections. Instrumental Variables: In columns 1, 2, 3, 5 and 6 lags of oil price-shocks are employed. Oil price shocks were estimated by predicting the residuals of an AR(2) process on real imported oil prices at refinery. In columns 4 and 7 ordinary lags of real imported oil prices were employed. In columns 1, 2 and 5 predicted oil price shocks were weighted by the index of industrial intensity (constructed using OECD data). In the remaining columns no weights are used. In column 1 we estimate the reduced form of the overidentified 2SLS model (with two endogenous regressors and three IV's, where data are averaged at the electoral term level) presented in Table 3, column 2. In columns 2 to 4 we estimate the reduced form of the just-identified IV model (columns 1, 3 and 5 of Table 5, respectively). As a result, we use 3 instruments (lags) in column 1, but only 1 lag (instrument) in all remaining specifications. Other controls include: first-past-the-post electoral rule dummy, number of parties, degree of institutional constraints, incumbent government defeated dummy (apart from columns 5 to 7 where it is the dependent variable), debt/GDP ratio, GDP growth rate, government revenues (income tax receipts) as a percent of GDP and a coalition government dummy. Variable "Institutional constraints" is the Index of institutional constraints of central state government according to Schmidt (1996); Minimum value=0; Maximum value=6; Range of data from 0 to 5, high values indicate powerful constraints, low values are indicative of a large maneuvering room available to central state government. Description: additive index composed of 6 dummy-variables ('1' = constraints, '0'=else) (1) EU membership=1, (2) degree of centralisation of state structure (federalism=1), (3) difficulty of amending constitutions (very difficult=1) (4) strong bicameralism =1 (5) central bank autonomy =1 (6) frequent referenda = 1. Source: Schmidt (1996: 172) transformed into time variant annual data. Data for central bank autonomy are taken from Beyeler (2007: 123). Period covered: 1960-2007. Missing: Greece 1967-1973, Portugal until 1975 and Spain until 1977.*

Table 8: *Replication of Estimates of Reduced IV Model under Alternative Instrument and Estimators on the Restricted Sample (excluding US and Oil Producing Countries).*

Dependent Variable	Restricted Sample (Excluding US and Oil Producers)					
Electoral Fragmentation (%)	IV	IV	IV	LDV	IV	IV
Rae Index (0-100)	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment Rate (%)	-1.87	-2.17	-2.01	-1.47	-2.05	-2.00
	(0.4637)***	(0.543)***	(0.509)***	(0.422)***	(0.501)***	(0.48)***
Incumbent Gov't Defeated	-1.49	-1.365	-1.431	-1.360	-1.412	-1.435
	(0.7924)*	(0.816)*	(0.793)*	(0.669)**	(0.801)*	(0.796)*
First-Past-the-Post ER	-4.67	-3.180	-3.992	-2.064	-3.761	-4.042
	(2.6531)*	(3.040)	(2.829)	(2.083)	(2.861)	(2.721)
Institutional Constraints	0.542	0.617	0.576	0.426	0.588	0.574
	(0.1205)***	(0.139)***	(0.129)***	(0.113)***	(0.129)***	(0.124)***
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Oil Importing Countries Only					
Instrument	L.1 Price	AR(2) Residual on Real Oil Prices			Trend of Real Oil Price	
Industrial Intensity Weights?	No	No	Yes	Yes	No	Yes
Obs.	185	185	185	185	185	185
R^2	0.803	0.836	0.847	0.887	0.844	0.847
F statistic (1^{st} Stage)	37.03	23.85	15.27	11.03	43.24	30.57

Note: *Robust Standard Errors, clustered at the Country level reported in parantheses. (***) $p < 0.01$; (**) $p < 0.05$; (*) $p < 0.10$. IV: In Column 1 we use the one year lag of real imported oil prices at refinery. In Columns 2 to 4 we use the lag of the predicted residual of an AR(2) process on real imported oil prices at refinery. In Columns 5 and 6 we use the trend of real imported oil prices at refinery. In Columns 3, 4 and 6 we use an index or relative industrial intensity for each country to weight the impact of the real oil price shocks on employment. Column 4 repeats the estimates of Column 3 using a model with lagged dependent variable. Variable instcons is the Index of institutional constraints of central state government according to Schmidt (1996); Minimum value=0; Maximum value=6; Range of data from 0 to 5, high values indicate powerful constraints, low values are indicative of a large maneuvering room available to central state government. Description: additive index composed of 6 dummy-variables ('1' = constraints, '0'=else) (1) EU membership=1, (2) degree of centralisation of state structure (federalism=1), (3) difficulty of amending constitutions (very difficult=1) (4) strong bicameralism =1 (5) central bank autonomy =1 (6) frequent referenda = 1. Source: Schmidt (1996: 172) transformed into time variant annual data. Data for central bank autonomy are taken from Beyeler (2007: 123). Period covered: 1960-2007. Missing: Greece 1967-1973, Portugal until 1975 and Spain until 1977. Incumbent Government Defeated Dummy takes the value of 1 if the incumbent has lost the elections. Other controls include: number of parties, Debt/GDP ratio, GDP growth and other socio-demographic characteristics..*

Table 9: *IV Estimates on the Diminishing Effect of Unemployment on Electoral Fragmentation on the Sample of Countries where Moderate Parties Exhibit High Ideological Proximity*

Dependent Variable	Restricted Sample (High Ideological Proximity)			
Electoral Fragmentation (%)	IV	IV	IV	IV
Rae Index (0-100)	(1)	(2)	(3)	(4)
Unemployment Rate (%)	-.394	-.478	-1.107	-.973
	(1.607)	(1.099)	(0.981)	(1.079)
First-past-the-post ER Dummy	-28.627	-33.726	-32.866	-33.050
	(3.565)***	(2.581)***	(2.731)***	(2.745)***
Institutional Constraints	-.-	0.777	-.872	-.520
		(1.458)	(1.639)	(1.672)
Institutional Constraints	-.-	0.525	0.775	0.722
Interaction Dummy		(0.312)*	(0.294)***	(0.324)**
Incumbent Govt. Defeated	-.-	-2.215	-2.045	-2.081
		(1.021)**	(1.099)*	(1.081)*
Other Controls	No	Yes	Yes	Yes
Const.	83.894	84.344	85.226	85.038
	(0.835)***	(1.907)***	(2.282)***	(2.216)***
Country FE?	Yes	Yes	Yes	Yes
Year FE?	Yes	Yes	Yes	Yes
Instrument (Real Oil Prices)	Trend	Trend	AR(2)	Lag 1
Obs.	122	122	122	122
R^2	0.962	0.968	0.963	0.965
F statistic (excluded IV)	21.07***	13.66***	8.99**	6.99**

Note: *Robust Standard Errors clustered at the Country level reported in parantheses. (***) Statistically significant at the 1% level; (**) Statistically significant at the 5% level; (*) Statistically significant at the 10% level. In Columns 2 to 4 other economic controls include: number of partis, Debt/GDP ratio, GDP growth rate, income per capita etc. In Columns 1 and 2 we use the trend of real (industry-weighted) imported oil prices at refinery obtained using the Hoddrick-Prescott filter. In Column 3 we use the lags of the predicted residuals of an AR(2) process on real imported oil prices at refinery weighted by the index of relative industrial intensity. In Column 4 we use the one year lag of real imported oil prices at refinery. Ideological proximity is measured according to the Schmidt Index (Max value is 4 Min value is -4 and Max distance is 8). Variable instcons is the Index of institutional constraints of central state government according to Schmidt (1996); Minimum value=0; Maximum value=6; Range of data from 0 to 5, high values indicate powerful constraints, low values are indicative of a large maneuvering room available to central state government. Description: additive index composed of 6 dummy-variables ('1' = constraints, '0'=else) (1) EU membership=1, (2) degree of centralisation of state structure (federalism=1), (3) difficulty of amending constitutions (very difficult=1) (4) strong bicameralism =1 (5) central bank autonomy =1 (6) frequent referenda = 1. Source: Schmidt (1996: 172) transformed into time variant annual data. Data for central bank autonomy are taken from Beyeler (2007: 123). Period covered: 1960-2007. Missing: Greece 1967-1973, Portugal until 1975 and Spain until 1977. Incumbent Government Defeated Dummy takes the value of 1 when the incumbent was defeated in the elections.*

Table 10: *OLS Estimates of the Impact of Reduced Expected Government Spending (triggered by the Information Shock) on Electoral Fragmentation in Greek Elections (2006-2010) in Regions (NUTS-3) with Large Public Sector Size*

Dependent Variable	Small Sample (2009-10)				Large Sample (2006-2010)			
Electoral Fragmentation	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
(Rae Index 0-100)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
High Public Sector∗POST	-.-	-.-	3.316	3.146	3.325	2.669	3.143	2.560
			(1.433)**	(1.477)**	(1.167)***	(1.210)**	(1.199)***	(1.246)**
POST (Electoral Year 2010)	1.973	2.057	0.561	0.596	5.398	5.260	5.392	5.260
	(0.889)**	(0.885)**	(0.772)	(0.775)	(1.367)***	(1.381)***	(1.368)***	(1.383)***
High Public Sector∗2009 (First Lead)	-.-	-.-	-.-	-.-	-.741	-.445	-.771	-.509
					(0.519)	(0.629)	(0.553)	(0.655)
Year 2009 (Dummy)	-.-	-.-	-.-	-.-	1.785	1.648	1.778	1.648
					(0.356)***	(0.376)***	(0.355)***	(0.377)***
Regional Unemployment (%)	0.109	0.172	0.15	0.118	0.038	-.099	0.031	-.099
	(0.382)	(0.394)	(0.329)	(0.328)	(0.155)	(0.157)	(0.153)	(0.157)
Unemployment∗High PS	-.-	-.-	-.-	-.-	-.-	0.576	-.-	0.556
						(0.284)**		(0.286)*
Local Elections Dummy	No	No	No	No	Yes	Yes	Yes	Yes
Treatment Leads (2009-2006)	No	No	No	No	Yes	Yes	Yes	Yes
Region (NUTS-3) Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Electoral Year Dummies	No	No	No	No	Yes	Yes	Yes	Yes
Obs.	92	96	96	92	192	192	184	184
R^2	0.78	0.83	0.86	0.83	0.76	0.76	0.72	0.73

Note: *Robust Standard Errors clustered at the NUTS-3 (Region) level reported in parentheses. (***) $p < 0.001$; (**) $p < 0.01$; (*) $p < 0.05$. Regional Fixed effects reported at the NUTS-3 level. POST dummy and Electoral Year 2010 dummy are the same variable. Electoral Year Dummies included in all reported specifications apart from the first four columns (they are collinear with the Post dummy since we only have two electoral years in the sample). Also in the first four columns, where we use the small sample, local elections dummies are not included due to collinearity. In Columns 1, 4, 7 and 8 we exclude the Athens and Thessaloniki Greater Metropolitan Regions from the regressions. In Columns 5 to 8 we use the large sample with electoral observations from 2006 to 2010. Hence, we can use pre-trend lead dummies. In Columns 6 and 8 we interact some of the controls with the treatment (High Public Sector) dummy.*

Table 11: *OLS Estimates of the Differential Impact of the Information Shock on Electoral Fragmentation in Greek Elections (1996-2010) in Regions (NUTS-3) with Large Public Sector Size*

Dependent Variable	Full Sample		Small Sample (2000-2010)		
Electoral Fragmentation	OLS	OLS	OLS	OLS	OLS
(Rae Index 0-100)	(1)	(2)	(3)	(4)	(5)
High Public Sector*Year 2010	2.370	2.871	2.468	2.852	8.953
	(1.013)*	(1.004)**	(1.055)*	(1.035)**	(3.366)**
Post Dummy (Year 2010)	2.917	3.493	1.126	0.786	0.786
	(0.938)**	(1.150)**	(0.541)*	(0.522)	(0.522)
First Lead	-.-	-.457	-.-	-.383	5.718
(High Public Sector*2009)		(0.604)		(0.738)	(3.273)
Local Elections Dummies	Yes	Yes	Yes	Yes	Yes
Demographic Controls	No	Yes	Yes	Yes	Yes
Economic Controls	No	No	Yes	Yes	Yes
Controls*Treatment	No	No	No	No	Yes
Treatment Leads (2009-1996)	No	Yes	No	Yes	Yes
Region (NUTS-3) Fixed Effects?	Yes	Yes	Yes	Yes	Yes
Year Dummies?	Yes	Yes	Yes	Yes	Yes
Obs.	384	384	288	288	288
R^2	0.624	0.629	0.679	0.681	0.681
F statistic	.	.	.	.	.

Note: *Robust Standard Errors clustered at the NUTS-3 region level reported in parentheses. (***) Statistically significant at the 1% level; (**) Statistically significant at the 5% level; (*) Statistically significant at the 10% level. Regional Fixed effects reported at the NUTS-2 (Periphery) level. Electoral Year Dummies included in all reported specifications. Other controls include: education and income per capita at regional (NUTS-3) level and level of urbanization. Attica and Thessalonica Metropolitan Regions are excluded from the sample.*

Table 12: *Estimates of the just-identified IV model using the quadratic term of unemployment on the restricted sample of countries (dropped USA and oil producers) under various instrument specifications*

Dependent Variable	Rae Index of Electoral (Party-system) Fragmentation (range 0-100)					
	Baseline Models			Averaged Data (at Election Term)		
	2SLS	2SLS	2SLS/LDV	2SLS	2SLS	2SLS/LDV
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment Squared (at Election Year)	0.146 (0.052)***	0.157 (0.059)***	0.125 (0.057)**	-.-	-.-	-.-
Unemployment Squared (Election Term Average)	-.-	-.-	-.-	0.185 (0.071)***	0.100 (0.028)***	0.072 (0.027)***
Institutional Constraints	1.710 (0.844)**	1.757 (0.862)**	1.556 (0.831)*	0.485 (0.925)	1.372 (1.674)	0.841 (1.238)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Industry weights?	Yes	No	Yes	Yes	No	No
Number of Instruments	1	1	1	1	1	1
Obs.	183	183	182	183	183	182
R^2	0.87	0.86	0.89	0.82	0.90	0.92
F statistic (1^{st}- Stage)	14.01	12.53	9.42	4.80	23.54	24.03

Note: *(***) $p < 0.01$; (**) $p < 0.05$; (*) $p < 0.10$. Robust standard errors, clustered at the country level reported in parentheses. Corrected standard errors reported in all columns (by estimating the models using the "ivregress" routine in Stata). In columns 3 and 6 a lagged dependent variable (LDV) was introduced into the model. Estimates of the squared undemployment term in column 1 are based on the predicted coefficient values of the basic 2SLS model presented in column 3 of Table 2. Estimates in Column 2 are based on the 2SLS model of column 5 in Table 2. Column 3 adds a LDV (estimates of the squared term are based on the coefficient estimates of the model presented in column 1 of Table 3. In columns 4 through 6 data were aggregated at the election term level (electoral term averages). Estimates in column 4 are based on the model of column 2 in Table 3, whereas those of column 5 are based on the model presented in column 6 of Table 3. Column 6 adds a LDV. Instrumental Variables: In columns 1-4 lags of oil price-shocks are used. Oil price shocks were estimated by predicting the residuals of an AR(2) process on real imported oil prices at refinery. In columns 5 and 6, simple lags of real imported oil prices were employed. In columns 1, 3 and 4 predicted oil price shocks were weighted by the index of industrial intensity constructed using OECD data. In columns 2, 5 and 6 no weights are used. We use 1 instrument in all specifications (just-identified model). Variable instcons is the Index of institutional constraints of central state government according to Schmidt (1996); Minimum value=0; Maximum value=6; Range of data from 0 to 5, high values indicate powerful constraints, low values are indicative of a large maneuvering room available to central state government. Description: additive index composed of 6 dummy-variables ('1' = constraints, '0'=else) (1) EU membership=1, (2) degree of centralisation of state structure (federalism=1), (3) difficulty of amending constitutions (very difficult=1) (4) strong bicameralism =1 (5) central bank autonomy =1 (6) frequent referenda = 1. Source: Schmidt (1996: 172) transformed into time variant annual data. Data for central bank autonomy are taken from Beyeler (2007: 123). Period covered: 1960-2007. Missing: Greece 1967-1973, Portugal until 1975 and Spain until 1977. Other controls include: first-past-the-post electoral rule dummy, number of parties, incumbent government defeated dummy, Debt/GDP ratio, GDP growth rate and government revenues (income tax receipts) as percent of GDP. Incumbent Govt Defeated Dummy takes the value of 1 if the incumbent has lost the elections.*

Appendix C

Supplementary Material for Chapter 3

C.1 Graphs

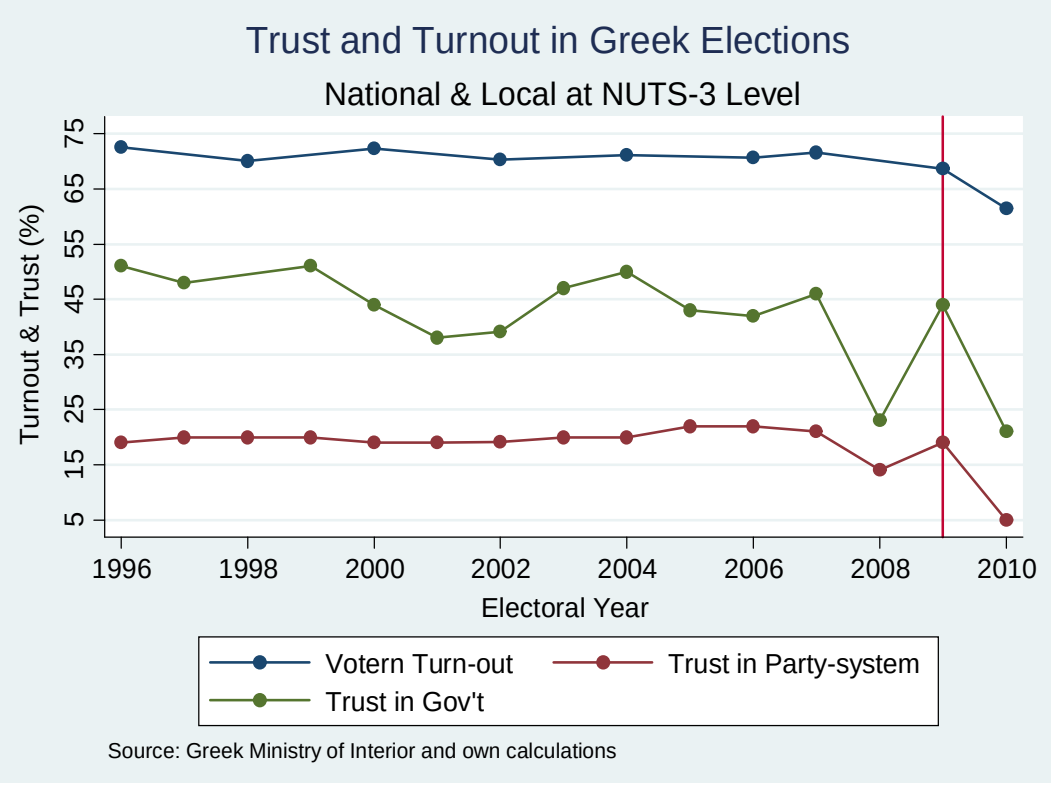


Fig. C.1.a: Parallel trends between Trust in Party-system and Voter Turn-out

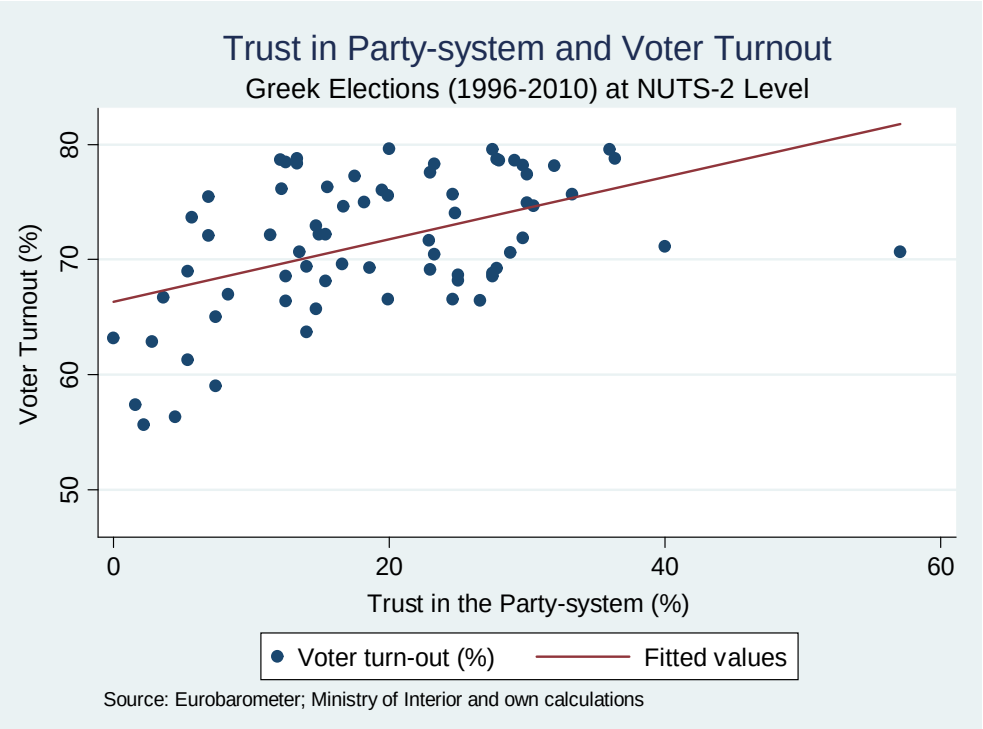


Fig. C.1.b: Correlation between Trust in Party-system and Voter Turnout

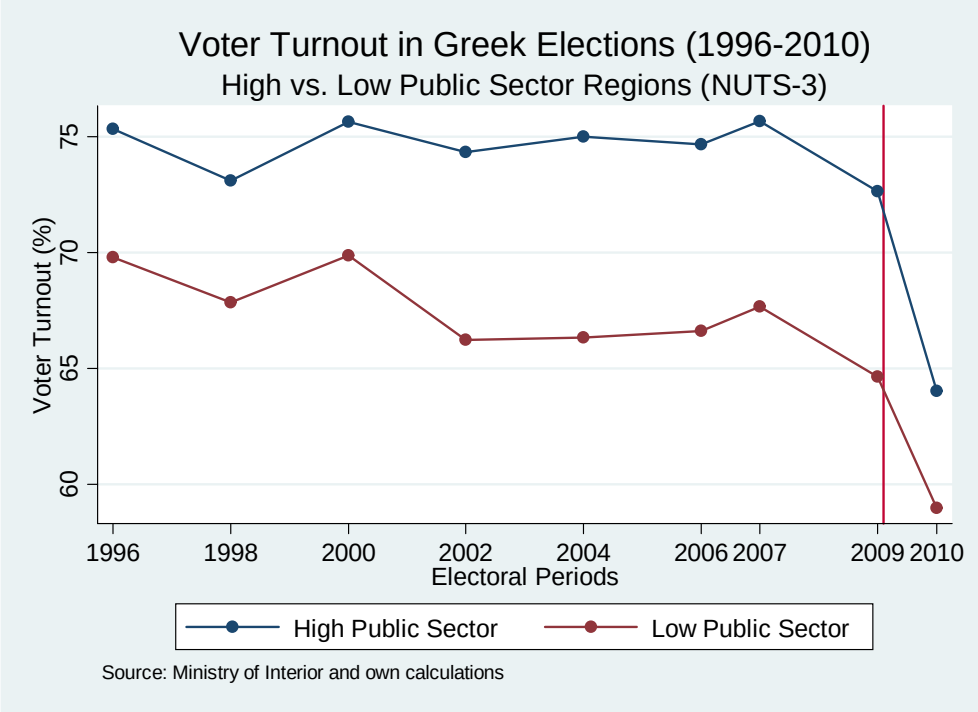
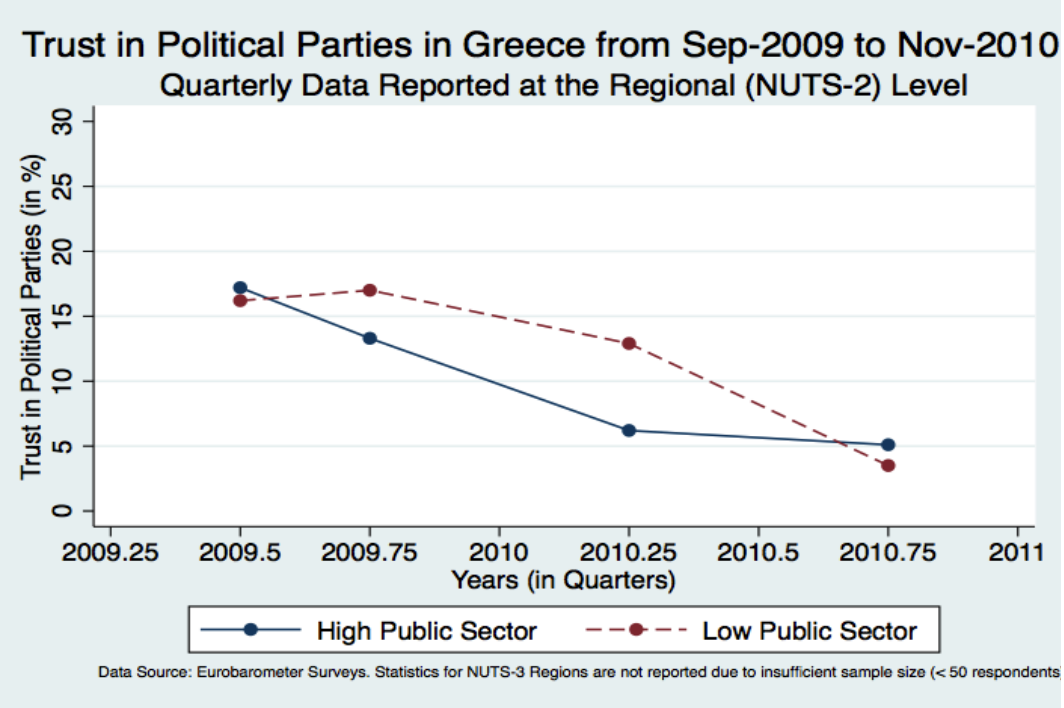


Fig. C.2: The larger Decline of Turnout in High Public Sector Regions



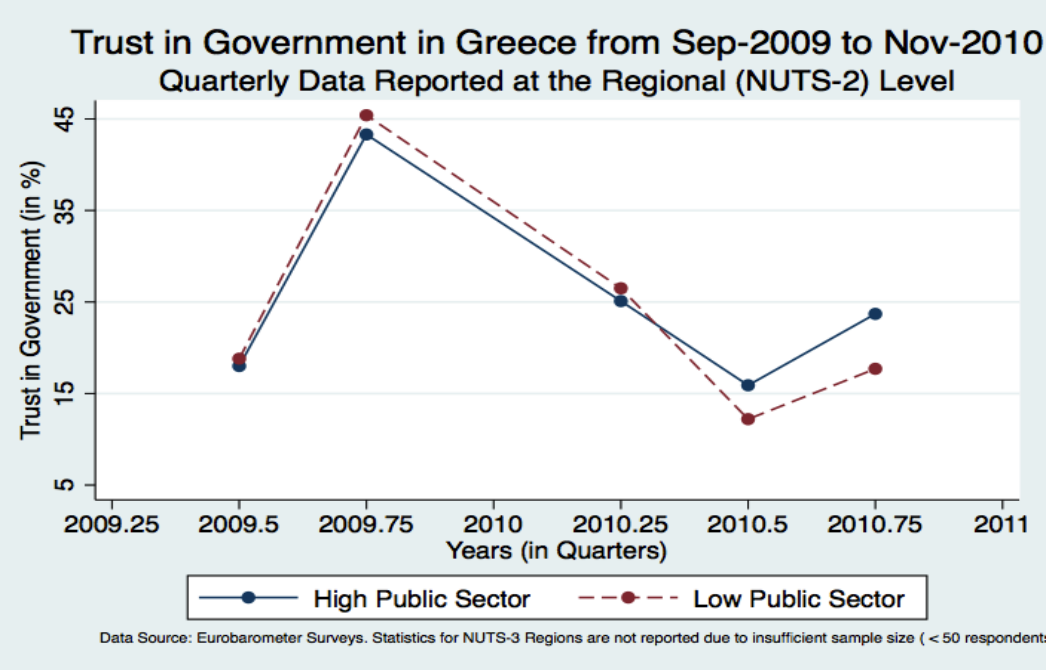


Fig. C.3: The Parallel Movement of Trust in Parties (above) and Government (below) across High &Low Public Sector Regions (NUTS-2 Level) post Information Shock (10/2009)

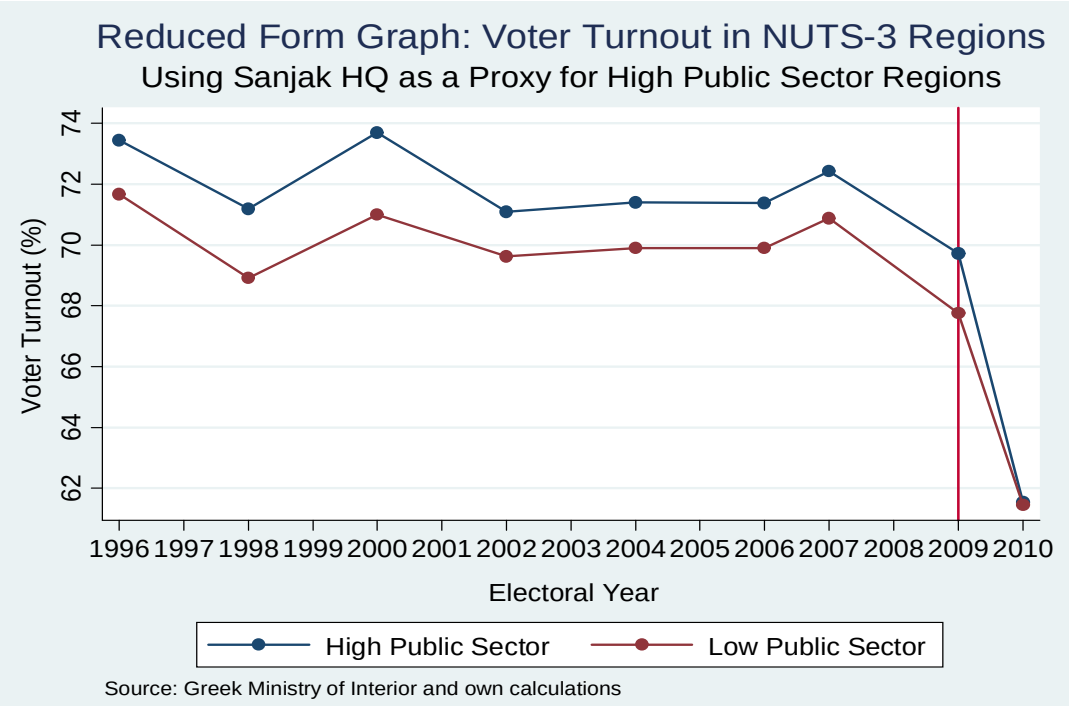


Fig. C.4: The Differential Impact of the Information Shock on High Public Sector Regions

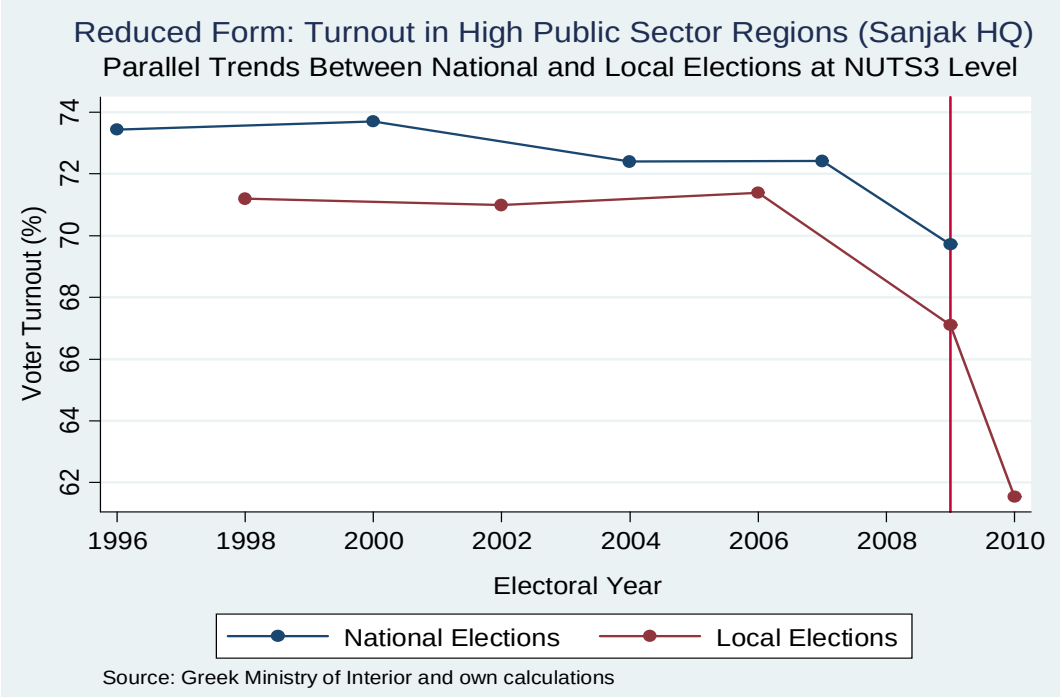


Fig. C.5: The Parallel Trends Assumption between National and Local Elections

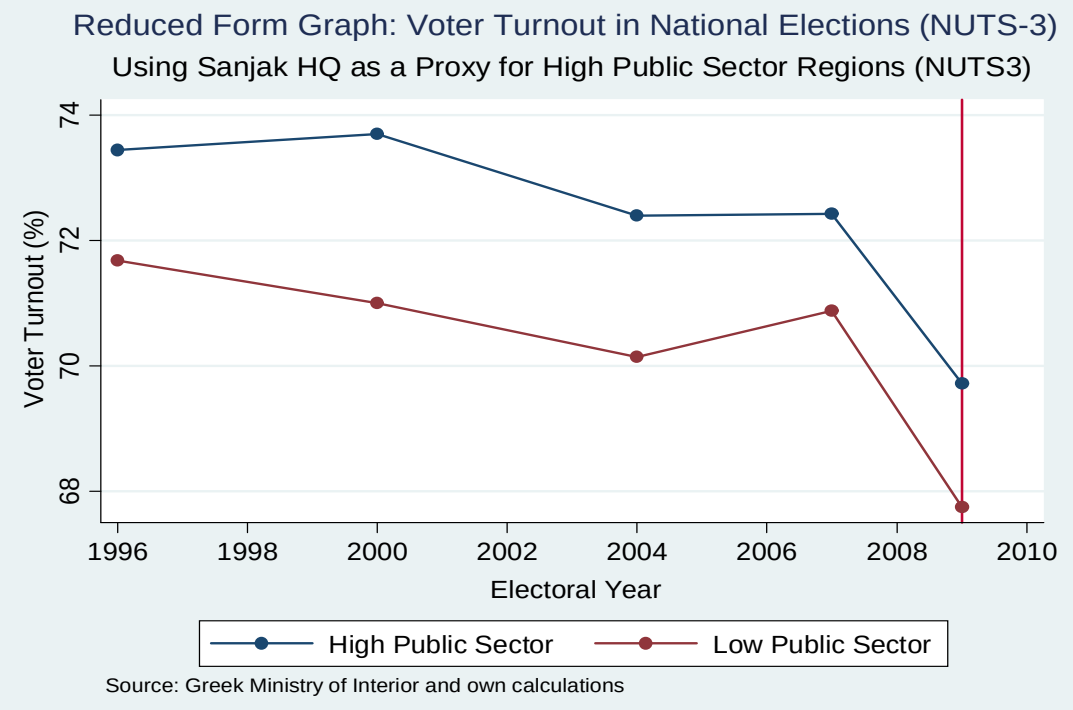


Fig. C.6.a: The Parallel Trends Assumption between High & Low Public Sector Regions

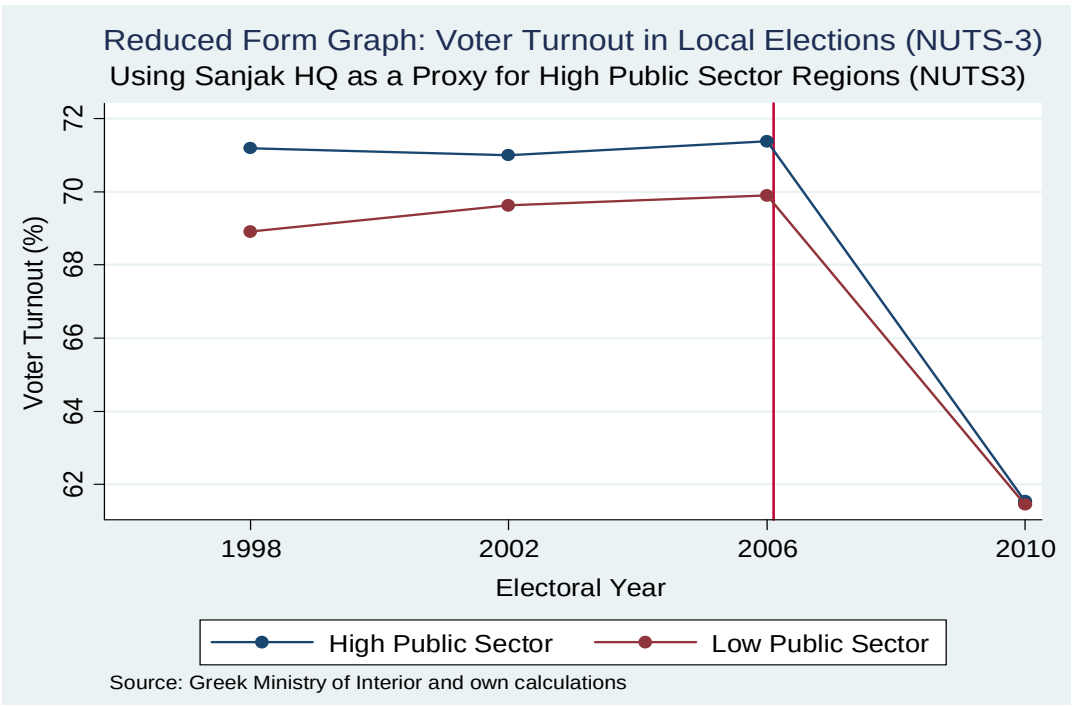


Fig. C.6.b: The Parallel Trends Assumption between High & Low Public Sector Regions

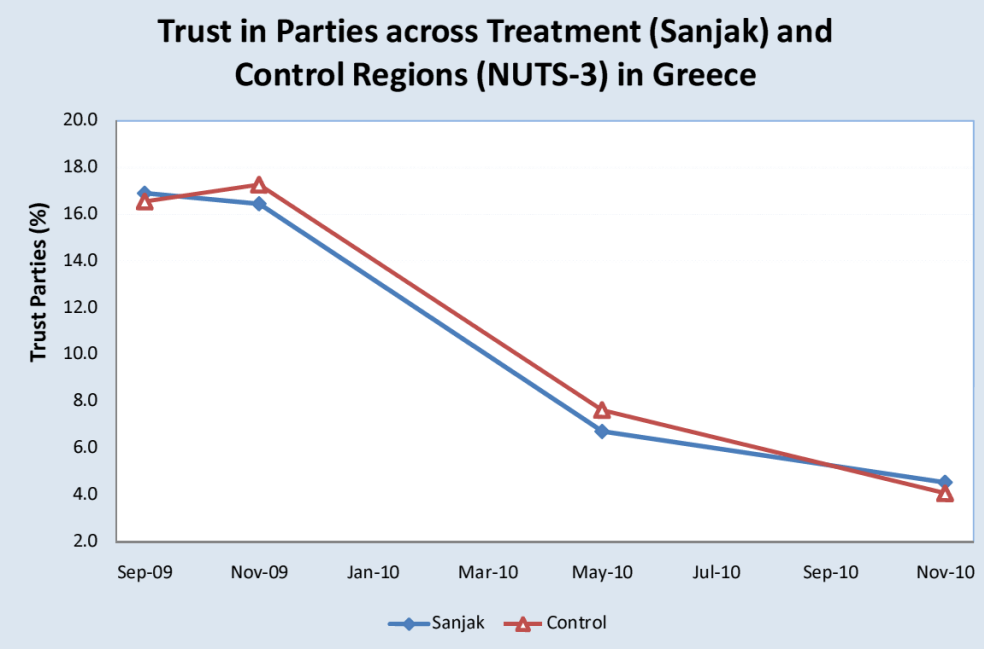


Fig. C.7.a: The Parallel Decline of Trust in Parties across Treatment & Control Regions (NUTS-2) post Information Shock (10/2009)

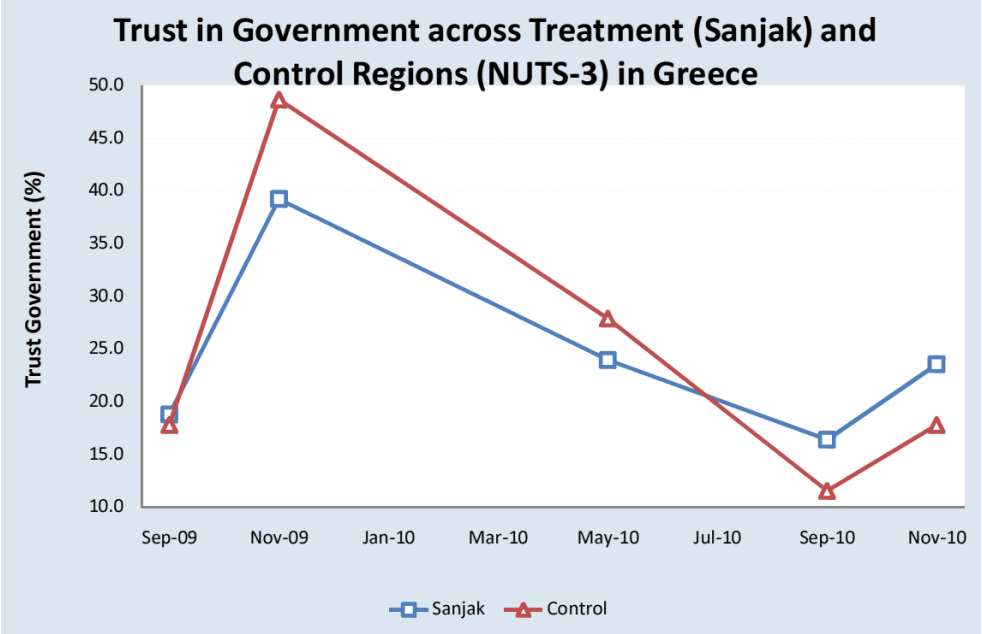


Fig. C.7.b: The Parallel Decline of Trust in Gov't across Treatment & & Control Regions (NUTS-2) post Information Shock (10/2009)

C.2 Tables

Table C.1: *Summary Statistics of Population and Public Sector Employment at the Periphery (NUTS-2) Level (2000-2008)*

Region Name	(1)	(2)	(3)	(4)	(5)
Periphery	Capital	Public Sector		Population	No of NUTS-2
(NUTS-3)		Share (%)	Growth (%)	(in 1,000s)	Regions
Thrace	Komitini	25.36	39.57	658	3
Macedonia	Thessaloniki	24.48	18.32	2,001	11
Thessaly	Larissa	26.54	31.29	719	4
Epirus	Ioannina	28.23	13.76	385	4
Ionian Islands	Kerkira	18.59	-2.29	237	3
W. Greece	Patras	25.06	27.71	700	3
Ctr. Greece	Lamia	20.53	29.56	551	5
Peloponnese	Tripoli	21.94	26.70	711	5
Attica	Athens	29.06	3.24	2,792	1
North Aegean	Mytelene	31.89	39.06	250	3
South Aegean	Rhodos	22.12	14.66	305	2
Crete	Heraklio	20.80	17.90	528	4
Greece (Total)	Athens	25.93	14.73	9,845	48

Sources: *Data collected from HELLSTAT 2011 Census, Greek Ministry of Interior and Public Administration, EUROSTAT 2010 Regional Yearbook and LFS survey (2009). Computation of growth rates in Col. 3 is from own calculations. We measure the size of the public sector as the share of public sector (central government, SOE's and local government) employment over total employment. Population statistics refer those eligible to vote (> 18 y.o.). Athens Metropolitan region (Attica) is at the same time both a NYUTS-2 and -3 region.*

Table C.2: *Summary Statistics of Treatment (Sanjak HQ) and Control Groups (NUTS-3 level)*

	(1)	(2)
	Treatment (Sanjak HQ)	Control
Annual Income p.c. (HPPP)	19,263	18,637
Education		
Secondary (%)	36.2	35.9
Tertiary (%)	24.1	24.0
Employment Share		
Agriculture (%)	18.7	20.5
Industry (%)	21.6	20.5
Public Sector Employment		
(% of total) in 2000	21.0	20.1
Growth Rate (2000-08)	27.9	15.1
(% of total) in 2009	26.4	22.9
Public Sector Jobs (%)		
(relative share of total public sector)	80.1	19.9
(relative share with agriculture)	1.5	1.1
Unemployment	7.8	8.6
Long-Run Unemployment	3.9	4.0
Long-Run Unemployment	51.5	46.7
(share of total %)		
Number of NUTS-3 Regions	23	25

Note: *Data from HELSTAT Population Census (2011) and Eurostat Regional Yearbook (2010) and LFS Survey (2009). Income is measured in Harmonized PPP. Public sector employment is given as a share of total employment.*

Table C.3: *OLS Estimates of our Basic Differences-in-Diferences Model on the Full Sample (1996-2010) at NUTS-2 Level*

Dependent Variable	Full Sample (1996-2010)			
Voter Turnout (%)	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)
High Public Sector*Year 2010	-.-	-.-	-6.463	-6.482
			(3.386)*	(3.173)**
Year 2010 (Post Dummy)	-8.704	-9.563	-6.598	-5.170
	(1.643)***	(1.701)***	(1.620)***	(1.598)***
High Public Sector*Year 2009 (Last lead)	-.-	-.-	-1.363	-1.801
			(1.485)	(1.070)
Trust in Party-system (%)	0.119	-.-	0.200	0.146
	(0.065)*		(0.06)***	(0.069)**
Trust in Government (%)	-.-	0.042	-.-	-.-
		(0.048)		
Trust*Local Elections Dummy	-.-	-.-	-.-	0.136
				(0.034)***
Treatment Leads (1996-2009)	No	No	Yes	Yes
Local Elections Dummies	Yes	Yes	Yes	Yes
Electoral Year Dummies?	Yes	Yes	Yes	Yes
Region (NUTS-2) Dummies?	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes	Yes
Obs.	90	90	90	90
R^2	0.812	0.796	0.842	0.85

Note: *Robust standard errors, clustered at the region level (NUTS-2) reported in parentheses. (*) Statistically significant at the 10% level. (**) Statistically significant at the 5% level. (***) Statistically significant at the 1% level. Demographic controls include education and urbanization levels at the regional level. Trust in Government and in the Party-system is reported at the regional level, as the percentage of the population who gave a positive response to a binary question. High Public Sector dummy is a binary variable taking the value of 1 if the percentage of public sector employment over total employment in 2009 was above the national average.*

Table C.4: *OLS Estimates of our Basic Differences-in-Diferences Model on the Restricted Sample of Elections (2000-2010) at NUTS-2 Level*

Dependent Variable	Small Sample (2000-2010)			
Voter Turnout (%)	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)
High Public Sector*Year 2010	-6.315	-6.217	-6.483	-6.415
	(3.130)**	(3.500)*	(2.990)**	(2.882)**
Year 2010 (Post Dummy)	-6.782	-6.873	-7.690	-5.073
	(2.157)***	(2.629)***	(1.524)***	(3.067)*
High Public Sector*Year 2009	-1.828	-1.599	-1.361	-1.685
(Last lead)	(1.107)	(1.634)	(1.721)	(1.328)
Trust in Party-system (%)	0.132	0.136	0.164	0.167
	(0.067)**	(0.067)**	(0.066)**	(0.062)***
Trust in Gov't (%)	-.-	-.-	-.-	-.050
				(0.034)
Trust*Local elections Dummy	-.-	-.-	0.063	0.088
			(0.057)	(0.063)
Treatment Leads (2000-2010)	Yes	Yes	Yes	Yes
Local Elections Dummies	Yes	Yes	Yes	Yes
Economic Controls	Yes	Yes	Yes	Yes
Econ. Controls * Treatment	No	Yes	No	Yes
Demographic Controls	Yes	Yes	Yes	Yes
Electoral Year Dummies?	Yes	Yes	Yes	Yes
Region (NUTS-2) Dummies?	Yes	Yes	Yes	Yes
Obs.	70	70	70	70
R^2	0.886	0.887	0.892	0.894

Note: Robust standard errors, clustered at the regional level (NUTS-2) reported in parentheses. (*) Statistically significant at the 10% level. (**) Statistically significant at the 5% level. (***) Statistically significant at the 1% level. Demographic controls include education and urbanization levels at the regional level. Economic controls include unemployment rate and income per capita at the regional level (from 1999 and onwards). Trust in Government and in the Party-system is reported at the regional level, as the percentage of the population who gave a positive response to a binary question. High Public Sector dummy is a binary variable taking the value of 1 if the percentage of public sector employment over total employment in 2009 was above the national average.

Table C.5: *Reduced Form OLS Estimations (Intensity to Treatment Effect) on the Differential Decline of Voter Turn-out on Regions (NUTS-3 Level) with High Public Sector*

Dependent Variable	Full Sample		Small Sample	
Voter Turnout (%)	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)
Sanjak HQ*Year 2010	-1.964	-3.272	-1.975	-3.370
	(1.002)*	(1.141)**	(0.791)*	(1.277)**
Year 2010 (Post Dummy)	-10.084	-10.180	-10.062	-10.275
	(1.387)***	(1.990)***	(1.298)***	(2.004)***
Sanjak HQ*2009 (Last lead)	-.-	-1.190	-.-	-1.316
		(0.673)		(0.814)
Treatment Leads (1996-2010)	No	Yes	No	Yes
Electoral Year Dummies	Yes	Yes	Yes	Yes
Region (NUTS-3) FE?	Yes	Yes	Yes	Yes
Local Election Dummies	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes	Yes
Economic Controls	No	No	Yes	Yes
Const.	74.771	74.316	65.985	66.483
	(0.941)***	(1.663)***	(3.869)***	(4.792)***
Obs.	423	423	329	329
R^2	0.783	0.784	0.867	0.868
F statistic	-.-	-.-	-.-	-.-

Note: *Robust standard errors, clustered at the regional level (NUTS-3) reported in parentheses. (*) $p < 0.05$. (**) $p < 0.01$. (***) $p < 0.001$. High public sector regions are identified by the presence of an Ottoman Military HQ (Sanjak) within their current administrative boundaries (see Table A.2). Full sample runs from 1996-2010. Small sample runs from 2000-2010. Demographic controls include education and urbanization levels at the regional level. Economic controls include unemployment rate and income per capita at the regional level (from 1999 and onwards).*

Table C.6: *Placebo Tests on Basic OLS Model moving the Treatment Effect (Information Shock) three Electoral Periods in the Past (2009, 2007 and 2006).*

Dependent Variable	2009		2007		2006	
Voter Turnout (%)	OLS	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)
Sanjak HQ*Year 2009	-1.138	-1.278	-.-	-.-	-.-	-.-
	(0.638)	(0.783)				
Sanjak HQ*Year 2007	-.-	-.-	-.470	-.497	-.-	-.-
			(1.423)	(0.845)		
Sanjak HQ*Year 2006	-.-	-.-	-.-	-.-	-.808	-.904
					(1.697)	(1.041)
Year 2009 (Post)	-3.953	-3.415	-.-	-.-	-.-	-.-
	(1.887)*	(2.544)				
Year 2007 (Post)	-.-	-.-	-1.607	-1.159	-.-	-.-
			(1.398)	(0.671)*		
Year 2006 (Post)	-.-	-.-	-.-	-.-	-1.195	-2.054
					(2.007)	(1.398)
Electoral Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Region (NUTS 3) FE?	Yes	Yes	Yes	Yes	Yes	Yes
Local Election Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Economic Controls	No	Yes	No	Yes	No	Yes
Const.	69.568	60.331	65.923	60.161	65.859	71.782
	(0.703)***	(1.566)***	(0.783)***	(0.559)***	(0.687)***	(1.949)***
Obs.	376	282	329	235	282	188
R^2	0.75	0.841	0.735	0.818	0.728	0.794
F statistic	-.-	-.-	-.-	-.-	-.-	-.-

Note: *Robust standard errors, clustered at the regional level (NUTS-3) reported in parentheses. (*) $p < 0.05$. (**) $p < 0.01$. (***) $p < 0.001$. High public sector regions are identified by the presence of an Ottoman Military HQ (Sanjak) within their current administrative boundaries (see Table A.2). Demographic controls include education and urbanization levels at the regional level. Economic controls include unemployment rate and income per capita at the regional level (from 1999 and onwards).*

Table C.7: *First-Stage OLS Regressions of Basic IV Model presented in Tables C.8 and C.9.*

Dependent Variable	1^{st} Stage Regressions			
High Public Sector	Full (1996-2010)		Small (2000-2010)	
Region (NUTS 3)* 2010	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)
Sanjak HQ*Year 2010	0.5725	0.5739	0.5741	0.5771
	(.129)***	(.130)***	(.131)***	(.132)***
Treatment Leads	No	Yes	No	Yes
Electoral Year Dummies	Yes	Yes	Yes	Yes
Region (NUTS-3) FE?	Yes	Yes	Yes	Yes
Local Election Dummies	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes	Yes
Economic Controls	No	No	Yes	Yes
Obs.	423	423	329	329
R^2	0.783	0.784	0.867	0.868
F statistic (excluded IV)	19.68***	19.51***	19.12***	19.03***

Note: *Robust standard errors, clustered at the regional level (NUTS-3) reported in parentheses. ((*) $p < 0.05$. (**) $p < 0.01$. (***) $p < 0.001$. IV: High public sector regions are instrumented by a dummy taking value 1 if an Ottoman Military HQ (Sanjak) was situated within their current administrative boundaries (see Table A.2). Full sample runs from 1996-2010. Small sample runs from 2000-2010. Demographic controls include education and urbanization levels at the regional level. Economic controls include unemployment rate and income per capita at the regional level (from 1999 and onwards). Columns 1 and 2 are the 1st-stages of Columns 2 and 4 in C.8, whereas 3 and 4 are the respective 1st-stages of Columns 2 and 4 in C.9.*

Table C.8: *IV and OLS Estimates on the Differential Declined in Turnout (Differences-in-Differences Model) across NUTS-3 regions (Full Sample).*

Dependent Variable	Full Sample (1996-2010)			
Voter Turnout (%)	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
High Public Sector*2010	-2.045	-3.423	-3.721	-5.701
	(0.990)*	(1.645)*	(0.922)***	(1.761)***
Year 2010 (Post Dummy)	-10.130	-7.250	-10.509	-7.054
	(1.420)***	(1.419)***	(1.991)***	(1.843)***
Last Lead (sanjak*2009)	-.-	-.-	-.-	-1.18
				(0.61)
Treatment Leads (1996-2009)	No	No	Yes	Yes
Electoral Year Dummies	Yes	Yes	Yes	Yes
Region (NUTS-3) FE?	Yes	Yes	Yes	Yes
Local Elections Dummies	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes	Yes
Economic Controls	No	No	No	No
Instrument for High Public Sector Regions (NUTS-3)	N/A	Sanjak HQ	N/A	Sanjak HQ
Observations	423	423	423	423
R^2	0.7827	0.7798	0.7871	0.7769
F statistic (excluded IV)	N/A	19.68***	N/A	19.51***

Note: *Robust standard errors, clustered at the regional level (NUTS-3) reported in parentheses. (*) $p < 0.05$. (**) $p < 0.01$. (***) $p < 0.001$. IV for High Public sector regions: Existence of Ottoman military district (Sanjak) HQ within the current administrative boundaries of a NUTS-3 region. Demographic controls include education and urbanization levels at the regional level. Athens and Thessalonica Metropolitan regions were excluded from the sample of regions in order to account for the "urbanization-education" effect.*

Table C.9: *IV and OLS Estimates on the Differential Declined in Turnout (Differences-in-Differences Model) across NUTS-3 regions (Including Economic Controls)*

Dependent Variable	Small Sample (2000-2010)			
Voter Turnout (%)	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
High Public Sector*2010	-2.495	-3.440	-3.686	-5.840
	(0.770)**	(1.199)**	(0.955)***	(1.921)**
Year 2010 (Post Dummy)	-9.910	-6.984	-10.490	-6.792
	(1.334)***	(0.734)***	(2.033)***	(1.035)***
Sanjak HQ*2009 (Last lead)	-.-	-.-	-.-	-1.298
				(0.721)
Treatment Leads (2000-2009)	No	No	Yes	Yes
Electoral Year Dummies	Yes	Yes	Yes	Yes
Region (NUTS-3) FE?	Yes	Yes	Yes	Yes
Local Elections Dummies	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes	Yes
Economic Controls	Yes	Yes	Yes	Yes
Instrument for High Public Sector Regions (NUTS-3)	-.-	Sanjak HQ	-.-	Sanjak HQ
Obs.	329	329	329	329
R^2	0.8674	0.8655	0.8694	0.8627
F statistic (excluded IV)	-.-	19.12***	-.-	19.03***

Note: *Robust standard errors, clustered at the regional level (NUTS-3) reported in parentheses. (*) $p < 0.05$. (**) $p < 0.01$. (***) $p < 0.001$. IV for High Public sector regions: Existence of Ottoman military district (Sanjak) HQ within the current administrative boundaries of a NUTS-3 region. Demographic controls include education and urbanization levels at the regional level. Economic controls include unemployment rate and income per capita at the regional level (from 2000 and onwards). Athens and Thessalonica Metropolitan regions were excluded from the sample of NUTS-3 regions in order to account for the "urbanization-education" effect.*

Bibliography

Bibliography

[1] Acemoglu, Daron, and J. A. Robinson (2012). *Why Nations Fail: The Origins of Power, Prosperity and Poverty.* New York: Crown Publishing Group Inc.

[2] Acemoglu, Daron, S. Johnson, and J. A. Robinson (2005), "Institutions as a Fundamental Cause of Long Run Growth", *Handbook of Economic Growth,* Vol.1, Part 1: 385-472.

[3] Acemoglu, Daron, and J. A. Robinson (2006), *Economic Origins of Dictatorship and Democracy,* Cambridge University Press, Cambridge and New York.

[4] Acemoglu, Daron, and J. A. Robinson (2000), "Why did the West Extend the Franchise? Democracy, Inequality, and Growth in Historical Perspective", *Quarterly Journal of Economics*, Vol. 115(4): 1167-1199.

[5] Aldrich, John H., J. M. Montgomery, and W. Wood, (2011). "Turnout as a Habit". *Political Behavior*, 33(4): pp. 535-563.

[6] Aldrich, John H., J. M. Montgomery, A. Taylor, and W. Wood, (2007). "Repeated Turnout as a Habit". *mimeo,* presented at the 2007 Annual Meeting of the Midwest Political Science Association.

[7] Alesina, A., "Macroeconomic Policy in a Two-Party System as a Repeated Game" (1987), *Quarterly Journal of Economics*, Vol. 120(3): 651-678.

[8] Alesina, A. and N. Roubini, "Political Cycles in OECD Economies" (1992), *Review of Economic Studies*, Vol. 59(4): 663-688.

[9] Angrist, Joshua D., and J. Pischke, (2009). *Mostly Harmless Econometrics: An Empiricist's companion*. Princeton, NJ: Princeton University Press.

[10] Angrist, Joshua D., G. W. Imbens, and D. B. Rubin, (1996). "Identification of Causal Effects Using Instrumental Variables". Journal of the American Statistical Association, 91(434): pp. 444-455.

[11] Arcelus, Francisco, and A. H. Meltzer, (1975). "The effects of Aggregate Economic Variables on Congressional Elections." *American Political Science Review* 69: pp. 1232–65.

[12] Armingeon Klaus, P. Potolidis, M. Gerber, and P. Leimgruber, (2009). "Comparative Political Data Set I 1960-2007". Institute of Political Science, University of Berne.

[13] Barro, Robert J (1996). "Institutions and Growth, an Introductory Essay". *Journal of Economic Growth,* 1(2): pp. 145-48.

[14] Bartsch, Ulrich (2006), "How much is Enough? Monte Carlo Simulations of an Oil Stabilization Fund for Nigeria," IMF Working Paper 06/142 (Washington: International Monetary Fund).

[15] Berinsky, Adam J., and G. S. Lenz (2011). "Education and Political Participation: Exploring the Causal Link", *Political Behavior* 33(3): pp. 357-373.

[16] Blais, André, (2006). "What Affects Voter Turnout?", *Annual Review of Political Science*, 9: pp. 111-125.

[17] Blais, André, (2000). *To Vote or Not to Vote? The Merits and Limits of Rational Choice*. Pittsburgh, PA: University of Pittsburgh Press.

[18] Blais, André, and A. Dobrzynska, (1998). "Turnout in Electoral Democracies". *European Journal of Political Research*, 33: pp. 239-261.

[19] Blais, André, E. Gidengil, N. Nevitte, and R. Nadeau, (2004). "Where Does Turnout Decline Come from?". European Journal of Political Research, 43: pp. 221-236.

[20] Blais, André, L. Massicotte, and A. Dobrzynska, (2003). *Why is Turnout Higher in Some Countries than in Others?*. Ottawa: Elections Canada.

[21] Blais, André, R. Young, and M. Lapp, (2000). "The Calculus of Voting: An Empirical Test". *European Journal of Political Research*, 37: pp. 181-201.

[22] Blanchard, Olivier J., and J. Gali (2007). "The Macroeconomic Effects of Oil Shocks. Why are the 2000s so Different from the 1970s?". *NBER Working Paper Series,* No. 13368.

[23] Bloom, Harold, and D. Price (1975). "Voter Response to Short-run Economic Conditions: The Asymmetric Effect of Prosperity and Recession." *American Political Science Review* 69: 124–54.

[24] Brady, H. E., K. Verba, and L. Schlozman, (1995). "Beyond SES: A Resource Model of Political Participation". American Political Science Review, 89: 271-295.

[25] Brody, Richard A., and P. M. Sniderman, (1977). "From Life Space to Polling Place: The Relevance of Personal Concerns for Voting Behavior". *British Journal of Political Science*, 7: pp. 337-360.

[26] Brody, Richard A., (1978). "The Puzzle of Political Participation in America". In A. King, (eds.), *The New American Political System*. Washington, DC: American Enterprise Institute.

[27] Campbell, A., P. E. Converse, W. E. Miller, and D. E. Stokes (1960). *The American Voter*. New York: Wiley.

[28] Campbell, James E., and J. Garand (2000). *Before the Vote: Forecasting American National Elections*. Thousand Oaks, CA: Sage Publications.

[29] Cashin, Paul, H. Liang, and C. J. McDermott (2000), "How Persistent Are Shocks to World Commodity Prices?". *IMF Staff Papers,* 47(2): pp. 177-217.

[30] Citrin, Jack (1974). "Comment: The Political Relevance of Trust in Government." *American Political Science Review*, 68(3): pp. 973-988.

[31] Citrin, Jack, and D. P. Green, (1986). "Presidential Leadership and the Resurgence of Trust in Government." *British Journal of Political Science*, 16(3): pp. 431-453.

[32] Colomer, Josep M., (2005). "It's Parties that Choose Electoral Systems (or, Duverger's Laws Upside Down)". *Political Studies*, 53: pp. 1-21.

[33] Council of Europe (1993). "Structure and Operation of Local and Regional Democracy - Greece." *Council of Europe*, Strasbourg.

[34] Cox, Gary W., and J. Morgan Kousser (1981). "Turnout and Rural Corruption: New York as a Test Case", *American Journal of Political Science* 25(4): 646-663.

[35] Denny, K., and S. Smith, (1993). "Local Taxation". *Report to the Commission* DG XXI. Prepared by the Institute for Fiscal Studies in London.

[36] Dixit, Avinash, and J. Londregan, (1995). "Redistributive Politics and Economic Efficiency". *American Political Science Review*, 89(4): pp. 856-866.

[37] Dixit, Avinash, and J. Londregan (1996). "The Determinants of Success of Special Interests in Redistributive Politics". *Journal of Politics*, 58: pp. 1132-1155

[38] Downs, Anthony, (1957). *An Economic Theory of Democracy*. New York: Harper.

[39] Duverger, Maurice (1951). *Political Parties: Their Organization and Activity in the Modern State*. New York: Wiley Press.

[40] Dziubiński, Marcin, and J. Roy (2011). "Electoral Competition in 2-Dimensional Ideology Space with Unidimensional Commitment". *Social Choice and Welfare,* 36(1): pp. 1-24.

[41] Eijffinger, Sylvester C. W., and J. De Haan, (1996). "The Political Economy of Central Bank Independence". In *Special Papers in International Economics*, No 19. Peter B. Kenen, K. S. Rogoff, M. B. Riccardi, L. Spais, and L. H. Chandra (eds.). Princeton, NJ: Department of Economics Princeton University.

[42] Engel, Eduardo, and R. Valdes (2000). "Optimal Fiscal Strategy for Mineral Exporting Countries". *IMF Working Paper,* 00/118. Washington, DC: International Monetary Fund.

[43] Esteban, Joan, and D. Ray, (2011). "Linking Conflict to Inequality and Polarization". *American Economic Review,* 101(4): pp. 1345-1374.

[44] Ergun, Selim J., (2010). "From Plurality Rule to Proportional Representation", *Economics of Governance*, Vol. 11(4): pp.

[45] European Commission (2010). *Report on Greek Government Deficit and Debt Statistics*, COM(2010) 1 Final. Brussels: 08.01.2010.

[46] European Commision Eurostat (2010). *Information Note on Greek Fiscal Data*, Directorate C: National and European Accounts. Brussels: 15.11.2010.

[47] Fiorina, Morris P., (1981). *Retrospective Voting in American National Elections*. New Haven, CT: Yale University Press.

[48] Fiorina, Morris P., (1978). "Economic Retrospective Voting in American National Elections: A Micro-analysis". *American Journal of Political Science*, 22: pp. 424-443.

[49] Fried, Marc, (1969). "Social Differences in Mental Health". In *Poverty and Health*, John Kosa (ed.), pp. 113-167. Cambridge, MA: Harvard University Press

[50] Grilli, Vittorio, D. Masciandaro, and G. Tabellini, (1991). "Political and Monetary Institutions and Public Financial Policies in the Industrial Countries". *Economic Policy*, 6(13): pp. 341-392.

[51] Groseclose, T. (2007), "One and a Half Dimensional Preferences and Majority Rule". *Social Choice and Welfare* 28: 321-335.

[52] Harrison, Mark, and N. Wolf, (2012). "The Frequency of Wars." *Economic History Review,* (forthcoming).

[53] Hetherington, Marc J. (1999). "The Effect of Political Trust on the Presidential Vote, 1968-96". *American Political Science Review*, 93(2): pp. 311-326.

[54] Hillygus, D. S. (2005). "The Missing Link: Exploring the Relationship between Higher Education and Political Behavior". *Political Behavior,* 27(1): pp. 25-47.

[55] Holbrook, Thomas M. (2008). "Incumbency, National Conditions, and the 2008 Presidential Election." PS: *Political Science and Politics,* 41: 709–12.

[56] Inalcik, Halil, (1954). "Ottoman Methods of Conquest." *Studia Islamica*, 2: pp. 103-129.

[57] Jackman, Richard W., (1987). "Political Institutions and Voter Turnout in Industrial Democracies". *American Political Science Review* 81(2): pp. 405-424.

[58] Jackman, Richard W., and R. A. Miller, (1997). "Voter Turnout in the Industrial Democracies During the 1980s". *Comparative Political Studies*, 27(4): pp. 467-492.

[59] Kaplan, Ethan and S. Mukand, (2011). "The Persistence of Political Partisanship: Evidence from 9/11", *mimeo*

[60] Keane, Michael P., and E.S. Prasad (1996), "The Employment and Wage Effects of Oil Price Changes: A Sectoral Analysis", *Review of Economics and Statistics*, Vol. 78(3): 389-400.

[61] Kennedy, Paul M. (1989). *The Rise and Fall of Great Powers.*

[62] Kernell, Samuel, (1977). "Presidential Popularity and Negative Voting: An Alternative Explanation of the Mid-term Congressional Decline of the President's Party". American Political Science Review, 71(1): pp. 44-66.

[63] Kiewiet, D. Roderick (1983). Macroeconomics and Micropolitics: The Electoral Effects of Economic Issues. Chicago: University of Chicago Press.

[64] Kiliç, Orhan (1999). "XVII. Yüzyılın İlk Yarısında Osmanlı Devleti'nin Eyâlet ve Sancak Teşkilatlanması." *Osmanlı*, Cilt 6: Teşkilât. Ankara, Turkey: Yeni Türkiye Yayınları (in Turkish).

[65] Kinder, Donald R., (1983). *Economic Performance and Political Choice.*

[66] Kinder, Donald R., G. S. Adams, and P. W. Gronke (1989). "Economics and Politics in the 1984 American Presidential Election." *American Journal of Political Science,* 33: pp. 491–515.

[67] Kinder, Donald R., and D. Roderick Kiewiet (1979). "Economic Discontent and Political Behavior: The Role of Personal Grievances and Collective Economic Judgments on Congressional Voting". *American Journal of Political Science,* 23: pp. 495–527.

[68] Kinder, Donald R., and D. Roderick Kiewiet, (1981). "Sociotropic Politics: The American Case." *British Journal of Political Science,* 11: pp. 129–141.

[69] Koliopoulos, J. S., (1997). "Brigandage and Irredentism in Modern Greece, 1821-1912." In *National Identity and Nationalism in Modern Greece*, T. Veremis (ed.). Athens: Cultural Foundation of the National Bank of Greece.

[70] Kosa, John (1969). "The Nature of Poverty". In *Poverty and Health: A Sociological Analysis*, A. Antonovsky, I. K. Zola, and J. Kosa (eds.), pp. 1-34. Cambridge, MA: Harvard University Press.

[71] Kostis, Kostas P., (2005). "The Formation of the State in Grece, 1830-1914." In *Citizenship and the Nation-State in Greece and Turkey*, Faruk Birtek, and T. Dragonas (eds.), pp. 18-36. London and New York: Rutledge Press.

[72] Kramer, Gerald, (1971). "Short-Term Fluctuations in U.S. Voting Behavior, 1896–1964." *American Political Science Review* 65: 131–43.

[73] Krasa, Stefan, and M. Polborn, (2010). "The Binary Policy Model", *Journal of Economic Theory,* 145(2): 661-688.

[74] Laakso, Markku and Rein Taagepera (1979). "Effective number of Parties: A measure with Application to West Europe." *Comparative Political Studies* 12, No.1:3-27.

[75] Larcinese, Valentino, J. M. Snyder Jr., and C. Testa, (2012). "Testing Models of Distributive Politics Using Exit Polls to Measure Voter Preferences and Partisanship." *British Journal of Political Science*, (forthcoming)

[76] Levitt, Steven D. (2001). "Alternative Strategies for Indentifying the Link Between Unemployment and Crime", *Journal of Quantitative Criminology*, Vol. 17(4): 377-390.

[77] Lijphart, A., (2000). "Turnout". In *International Encyclopedia of Elections*, R. Rose (ed.), pp. 314-322. Washington, DC: CQ Press.

[78] Lipset, S. Martin, (1960). *Political Man.* New York: Doubleday

[79] Lyrintzis, C., (1987). "The Political and Patronage System in Nineteenth-century Greece." *Hellenike Koinonia*, 1(2): pp. 157-182 (in Greek).

[80] Malte-Brun, Conrad, and J.-J. N. Huot, (1834). *A System of Universal Geography: A Description of all the Parts of the World on a New Plan, According to the Great Natural Divisions of the Globe*, Vol. III, James G. Percival (ed.). Boston, MA: Samuel Walker Publishers Inc.

[81] Matakos, Konstantinos, and D. Xefteris (2010). "An Economic Model of Strategic Electoral Rule Choice under Uncertainty", *The Warwick Economics Research Papers Series*, TWERP No. 917b, University of Warwick, Coventry, UK.

[82] Maurer, Harry (1980). *Not Working: An Oral History of the Unemployed*. New York: Holt, Rinehart and Winston.

[83] Meltzer, Allan H., and S. F. Richard (1981). "A Rational Theory of the Size of Government", *Journal of Political Economy,* Vol. 89(5): 914-927

[84] Miller, Arthur H., E. Goldenberg, and L. Erbring, (1979). "Type-Set Politics: Impact of Newspapers on Public Confidence." *American Political Science Review*, 73(1): pp. 67-84.

[85] Mouzelis, N., (1996). "The Concept of Modernisation: Its Relevance for Greece." *Journal of Modern Greek Studies*, 14(2): pp.

[86] Nie, N. H., J. Junn, and K. Stehlik-Barry, (1996). *Education and Democratic Citizenship in America*. Chicago, IL: University of Chicago Press.

[87] Nordhaus, William D., (1975). "The Political Business Cycle", *Review of Economic Studies,* 44(2): pp. 169-190.

[88] Persson, Torsten, and G. Tabellini (2003). *The Economic Effects of Constitutions*, MIT Press, Cambridge, MA.

[89] Persson, Torsten, G. Roland, and G. Tabellini, (2007). "Electoral Rules and Government Spending in Parliamentary Democracies", *Quarterly Journal of Political Science*, 1(1): pp. 1-34.

[90] Petmezas, S., (1990). "Political Liberation Struggles and National Integration in Greece." *Histor*, 2(3) (in Greek).

[91] Petropulos, J. A., (1968). *Politics and Statecraft in the Kingdom of Greece, 1833-1843*. Princeton, NJ: Princeton University Press.

[92] Powell, Gary B. Jr., (1982). *Comparative Democracies: Participation, Stability and Violence.* Cambridge, MA: Harvard University Press.

[93] Powell, Gary B. Jr., (1986). "American Voter Turnout in Comparative Perspective". *American Political Science Review* 80(1): pp. 17-43.

[94] Powell, Gary B. Jr., and G. D. Whitten, (1993). "A Cross-national Analysis of Economic Voting: Taking Account of the Political Context". American Journal of Political Science, 37(2): pp. 391-414.

[95] Pyndick, Robert (1999). "The Long-run Evolution of Energy Prices". *Energy Journal,* Vol. 20(2): 127

[96] Quataert, Donald, and Ş. Pamuk, (1994). "Part IV: The Age of Reforms, 1812-1914." In *An Economic and Social History of the Ottoman Empire: 1300-1914*, Halil Inalcik, and D. Quataert (eds.), pp. 759-943. Cambridge, UK: Cambridge University Press.

[97] Radcliff, B. (1992). "The Welfare State, Turnout, and the Economy". American Political Science Review, 86: pp. 444-456.

[98] Rae, Douglas W. (1968). "A note on the fragmentation of Some European Party Systems", *Comparative Political Studies* 1: 413-418.

[99] Reny, Philip J., (1999). "On the Existence of Pure and Mixed Strategy Nash Equilibria in Discontinuous Games", *Econometrica* 67(5): pp. 1029-1056.

[100] Rose, R. (2004). "Voter Turnout in the European Union Member Countries". In *Voter Turnout in Western Europe since 1945*, R. Lopez Pintor (ed.), pp.17-24. Stockholm: Int. IDEA.

[101] Rosenstone, Steven J., (1982). "Economic Adversity and Voter Turnout". American Journal of Political Science, 26(1): pp. 25-46.

[102] Rosenstone, Steven J., and R. E. Wolfinger, (1978). "The Effect of Registration Laws on Voter Turnout". *American Political Science Review*, 72(1): pp. 22-45.

[103] Rosenstone, Steven J., and J. M. Hansen, (1993). *Mobilization, Participation, and Democracy in America*. New York: MacMillan Publishing Company.

[104] Schlozman, K. Lehman, (2002). "Citizen Participation in America: What do we Know? Why do we Care?". In Katznelson, I., and H. V. Milner (eds.), *Political Science: State of the Discipline* (pp. 433-461). New York: W.W. Norton and Co.

[105] Schlozman, K. Lehman, and S. Verba, (1979). *Injury to Insult*. Cambridge, MA: Harvard University Press.

[106] Shapiro Carl, and J. E. Stiglitz, (1984). "Equilibrium Unemployment as a Worker Discipline Device". *The American Economic Review* 74(3): 433-444.

[107] Skene, James Henry Esq., (1851). *The Three Eras of Ottoman History: A Political Essay on the Late Reforms of Turkey, Considered Principally as Affecting her Position in the Event of a War Taking Place*. London: Chapman and Hall

[108] Sniderman, Paul M., and R. A. Brody, (1977). "Coping: The Ethic of Self-relience". *American Journal of Political Science*, 21: pp. 501-521.

[109] Sondheimer, R. M., and D. P. Green, (2010). "Using Experiments to Estimate the Effects of Education on Voter Turnout". *American Journal of Political Science*, 54(1): pp. 174-189.

[110] Staiger, D., and J. H. Stock, (1997). "Instrumental Variables Regression with Weak Instruments". *Econometrica*, 65(3): pp. 557-586.

[111] Tenn, S., (2007). "The Effect of Education on Voter Turnout". *Political Analysis,* 15(4): pp. 446-464.

[112] Tufte, Edward (1978). Political Control of the Economy. Princeton, NJ: Princeton University Press.

[113] Van Wijnbergen, S. (1985). "Oil Price Shocks, Unemployment, Investment and the Current Account: An Intertemporal Disequilibrium Analysis", *Review of Economic Studies*. 52(4): 627-645.

[114] Verba, Sidney, and N. H. Nie, (1972). *Participation in America*. New York: Harper Row.

[115] Verba, Sidney, K. L. Schlozman, and H. Brady, (1995). *Voice and Equality: Civic Voluntarism in American Politics*. Cambridge, MA: Harvard University Press.

[116] Wilcock, Richard C., and W. H. Franke, (1963). *Unwanted Workers*. New York: Free Press.

[117] Wolfinger, Raymond E., and S. J. Rosenstone, (1980). *Who Votes?* New Haven, CT: Yale University Press.